Nineteen New Genera and 82 New Species of Cremnorrhinina from Australia, Including Analyses of Host Relationships and Distributions (Insecta: Hemiptera: Miridae: Phylinae: Cremnorrhinini)

Randall T. Schuh
and Michael D. Schwartz

Bulletin of the American Museum of Natural History

NINETEEN NEW GENERA AND 82 NEW SPECIES OF CREMNORRHININA FROM AUSTRALIA, INCLUDING ANALYSES OF HOST RELATIONSHIPS AND DISTRIBUTIONS (INSECTA: HEMIPTERA: MIRIDAE: PHYLINAE: CREMNORRHININI)

RANDALL T. SCHUH
Division of Invertebrate Zoology
American Museum of Natural History

MICHAEL D. SCHWARTZ
Division of Invertebrate Zoology
American Museum of Natural History

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY
Number 401, 279 pp., 172 figures, 5 tables
Issued April 22, 2016

Copyright © American Museum of Natural History 2016 ISSN 0003-0090

CONTENTS

Abstract 3
Introduction 3
Materials and Methods 4
Taxonomy of Australian Cremnorrhinina 6
Adunatiphylus, new genus 31
Asterophylus, new genus 33
Austroplagiognathus, new genus 38
Bifidostylus, new genus 42
Dicyphylus, new genus 65
Eremotylus, new genus 77
Grandivesica, new genus 86
Gyrophallus, new genus 99
Halophylus, new genus 113
Lepidophylus, new genus 129
Maculiphylus, new genus 132
Monospiniphallus, new genus 134
Myoporophylus, new genus 140
Myrtophylus, new genus 145
Omnivoriphylus, new genus 153
Proteophylus, new genus 162
Pulvillophylus, new genus 173
Spinivesica, new genus 182
Telophylus, new genus 201
General Discussion 206
Acknowledgments 220
References 221
Plates ..... after page 222

ABSTRACT

The tribe Cremnorrhinini, subtribe Cremnorrhinina, is recognized for the first time as occurring in Australia. Existing collections allow for the description of the following 19 new genera within which 82 new species of the group are placed: *Adunatiphylus*, *Asterophylus*, *Austroplagiognathus*, *Bifidostylus*, *Dicyphylus*, *Eremotylus*, *Grandivesica*, *Gyrophallus*, *Halophylus*, *Lepidophylus*, *Maculiphylus*, *Monospiniphallus*, *Myoporophylus*, *Myrtophylus*, *Omnivoriphylus*, *Proteophylus*, *Pulvillophylus*, *Spinivesica*, and *Telophylus*. Documentation is provided in the form of a subtribal diagnosis, key to genera, diagnoses and descriptions of all genera and species, color habitus images of males (and females where available) of all species, distributional maps, illustrations of male genitalic structures, images of the endosoma of all species and female genitalic structures in representative species, and scanning electron micrographs of representative morphology within the group based on a sample of nine genera. Host-plant information is provided for most species, along with representative images of hosts and habitats. Available data show that a preponderance of species are associated with the genus *Eremophila* (Scrophulariaceae), but with additional lineages associated with the plant groups Asteraceae, Chenopodiaceae (Amaranthaceae), Myrtaceae, and Proteaceae, among others in much smaller numbers.

INTRODUCTION

Reuter (1910) was the first author to diagnose higher categories within Miridae on the basis of pretarsal structure. Knight (1918) indicated that he was not able to interpret Reuter's scheme such that he could produce a key to the taxa. Nonetheless, he adapted Reuter's (1910) classification on the basis of many of his own original observations on the pretarsus of North American taxa and was the first author to produce illustrations of the Miridae pretarsal structures referred to by Reuter (1910). Knight (1918) observed that there were actually two morphologically distinct structures that had been referred to by Reuter (1910) and other authors (e.g., Poppius, 1914) as claw-arolia, a catchall term for any fleshy pretarsal structure. Knight (1918) restricted the term *arolium* to those structures arising from the unguitractor plate and applied the term *pseudoarolium* to structures arising from the claws themselves. Knight (1923) later corrected the details of morphology for some of the taxa illustrated in his 1918 presentation and continued to use those figures in later papers (Knight 1941, 1968) and thereby strongly influenced understanding of pretarsal structure and morphological diversity by subsequent authors (see Wagner, 1952; Carvalho, 1955).

With regard to terminology, it was the works of Cobben (1968) and Goel and Schaeffer (1970) that initiated a move to the morphologically more relevant terms *parempodium* and *pulvillus*, the former for the arolium and the latter for the pseudarolium of Knight. At about the same time Schuh (1976) clarified certain details of pretarsal structure in the Miridae through the use of scanning electron microscopy. The above-cited papers document that within the Miridae it is the Phylinae that show the greatest range of size and structural diversity in the pulvillus and parempodium.

The work of Menard et al. (2014) presented a classification of the Phylinae based on DNA sequences and morphological data. Their sample of 160 taxa from all major continental areas (except Antarctica, of course) included a grouping (fig. 1), all members of which possess pulvilli as long as the entire claw and usually free from it except at the base, although occasionally adnate to the entire ventral claw surface; in this grouping the parempodia are always setiform. Menard et al. (2014) and Schuh and Menard (2013) applied the name Cremnorrhina [sic] Reuter, 1883, to this assemblage of taxa and treated the elongate pulvilli as diagnostic for it. Members of this grouping had previously been placed in a variety of higher taxa, including the Hallodapini and Phylini (Carvalho, 1952, 1958), Cremnorrhinini and Phylini (Wagner, 1974), Pronotocrepini and Phylini (Knight, 1929; Wyniger, 2010, 2012), or Phylini (Schuh, 1995).

Even though Knight (1918) and others early on followed Reuter (1910) in adopting

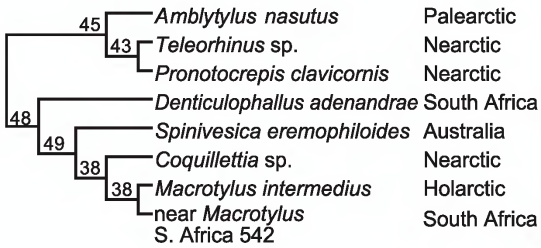


Fig. 1. Relations of Cremnorrhinina taxa based on morphology and DNA sequence data (modified from Menard et al., 2014).

the taxonomic value of the pretarsus, its use was attacked by China and Myers (1929) on the premise that these somatic features were subject to adaptation and therefore of little phylogenetic value. Nonetheless, Carvalho (1952, 1955) relied heavily on pretarsal structure to define taxa in his world classification of the Miridae but without formal argumentation as to why he found the character system to be of value. Schuh (1976) argued against the adaptational premise on the basis of taxonomic congruence. We assert that the findings of Menard et al. (2014) lend further credence to the idea that pretarsal structure is one of the most consistent features in Miridae structure and that indeed consistency of structure—in conjunction with taxonomic congruence—is the strongest indicator of propinquity of descent.

Reuter (1883) had erected the group Cremnorrhinaria to include only the genus *Cremnorrhinus* Reuter. As pointed out by Schuh and Menard (2013), Wagner (1969, 1974) was one of the few subsequent authors to recognize the Cremnorrhinini, but he did not include in it many genera with elongate pulvilli (e.g., *Amblytylus* Fieber, *Lopus* Hahn, and *Excentricoris* Carvalho) from the Western Palearctic. Contrary to the conclusions of Reuter (1883), Knight (1929), Carvalho (1952, 1958), Schuh (1974), Wagner (1969, 1974), and others, the studies of Menard et al. (2014) and Schuh and Menard (2013) corroborate the theory that nearly all Phylinae with long pulvilli belong to a monophyletic group that is essentially worldwide in scope (but absent from Central and South America and tropical Asia) and that includes substantial—but previously unrecognized and undescribed—diversity in Australia.

In the present paper we describe and document 82 new species of Cremnorrhinina from Australia that we place in 19 new genera. We present host data for the preponderance of the species, showing that these taxa occupy a limited range of plant taxa and most show substantial host specificity. We discuss the Australian genera as an apparently monophyletic group and attempt to relate them to the remaining Cremnorrhinina from Africa and the Holarctic. Unlike most members of the Cremnorrhinina from outside Australia, only one lineage of antipodean taxa has the elongated head and face as seen in nearly all other taxa placed in the group.

In spite of the large number of taxa described in this paper and the extensive fieldwork that led to their assembly, a tremendous amount of fieldwork and study still needs to be done before we can claim to have a mature understanding of phyline diversity and classification in Australia, including that for the Cremnorrhinina. Nonetheless, this paper offers a glimpse into what is certainly one of the largest monophyletic radiations in the Phylinae for the continent.

MATERIALS AND METHODS

Genera within the present paper are arranged in alphabetical order as are the species within them. The generic diagnoses and discussions provide comments on how to distinguish the various taxa from one another as does the key that follows the diagnosis and discussion of the Cremnorrhinina. All these elements are based on males, and then compared with females where there are significant differences. The General Discussion at the end of the paper provides a summary overview of host relationships and distributional patterns within and outside of Australia.

Because our taxonomy of the Australian Cremnorrhinina is heavily based on detailed structure of the male genitalia, and because we observed and drew those structures using temporary slide mounts and a compound microscope, we strongly recommend that future studies of the group follow similar procedures. Otherwise, it may be difficult or impossible to see structures that we have used to diagnose and distinguish taxa. Our

male genitalic terminology follows that of Cassis (2008) in the use of the term *endosoma* rather than *vesica* as had been the practice in much of the literature on Miridae. Remaining terminology is similar to that used by Schuh (2006) and Weirauch (2007) when referring to the orientation of structural features of the endosoma, parameres, and phallotheca (see figs. 2, 6, 10 for explanation). The female genitalia were also observed with temporary preparations; terminology of the bursa copulatrix and genital chamber are adapted from Schuh (2006), Schuh and Pedraza (2010), and Schuh and Weirauch (2010).

Our generic concepts are based on what we believe to be the most consistent morphological character information available to diagnose each of the recognized groups. We have not attempted to prepare a rigorous phylogenetic analysis of the genera because there is insufficient data available to produce a dichotomous scheme containing all of the groups. We argue, nonetheless, that our classification offers a set of strong, testable hypotheses for generic and species concepts in the Australian Cremnorrhinina on which future work, especially that using DNA sequence data, can be based.

Data for the 6244 specimens examined for this study have been captured using the American Museum of Natural History instance of the Arthropod Easy Capture database, which was originally developed with funding from a U.S. National Science Foundation (NSF) Planetary Biodiversity Inventories award for plant bugs, Randall Schuh and Gerasimos Cassis principal investigators. The database application was further enhanced with funding from an NSF ADBC-TCN award to the American Museum of Natural History. All specimens bear a unique specimen identifier (USI) in the form AMNH_PBI 00000000; this alphanumeric is included on the USI label also in the form of a matrix code. Specimen data can be viewed online (through Discoverlife.org, research.amnh.org/pbi/heteropteraspeciespage/), and through the iDigBio web portal (https://www.idigbio.org/portal).

Because USI information for the majority of specimens contains the institutional string AMNH_PBI we have abbreviated the information in the sections on Specimens Examined to just the numerical portion of the USI, except in the cases of holotype specimens where the entire USI is listed. For the much smaller numbers of specimens bearing USI labels with the institutional string UNSW_ENT we list the entire alphanumeric USI.

Habitus images were prepared using a Microptics/Visionary Digital photomicrographic system as developed by Roy Larimer. Multiple layers were stacked using Helicon Focus© to produce the final high-depth-of-field image. Genitalic illustrations were initially prepared as pencil drawings, then scanned and rendered as graphics using Adobe Illustrator©. All such illustrations were drawn using a compound microscope with 20× and 40× objective lenses. Photographic images of genitalic structures temporarily placed under a coverslip in shallow well-slides containing 85% lactic acid were taken with a 10× or 20× objective lens using a Nikon E800 compound microscope, photomicrographic attachment, and software. As many 50 layers were stacked to produce a composite high-depth-of-field image. Scanning electron micrographs were prepared using a Hitachi 4300 digital microscope.

Measurements were prepared using digital micrometers attached to a movable stage, the data being recorded directly to a spreadsheet in the form of calculated distances. All measurement data are in millimeters. The data are presented in summary form in table 1 with the numbers of specimens measured, means, and standard deviations. In the descriptions the length of antennal segment 2 is given as a value and also compared to the width of the head in order to give an indication of both absolute and relative length; these values and calculations are based on the means of the specimen-measurement sample rather than the measurements for a single specimen.

The host data presented in this paper result from a concerted effort on the part of Gerasimos Cassis, Randall Schuh, and their colleagues to prepare herbarium-quality plant voucher specimens during their fieldwork. All plant specimens were identified by botanical specialists with no knowledge of their herbivore faunas, thus offering an independent assessment of host identities. We do not list the authors of host taxa in the text and plate

captions but provide a comprehensive presentation of this information in table 2.

Because of the existence of competing plant classifications, we have made some choices about which classification to use. In particular, we have grouped halophytic genera traditionally placed in the Chenopodiaceae under that name, believing it represents a monophyletic group. The alternative would be to use the name Amaranthaceae, an approach that does not speak to the monophyly of the traditional Chenopodiaceae. We have placed the genera *Eremophila* and *Myoporum* in the Scropulariaceae rather than the Myoporaceae as done by some Australian botanists.

Specimens examined during this study came from the following collections or are deposited in them; the institutional abbreviations used in the Materials Examined sections precede the institutional name and the names of individuals who assisted with the loan of specimens follow the institutional name:

AM	Australian Museum, Sydney; Gerasimos Cassis, David Britton
AMNH	American Museum of Natural History, New York; Randall T. Schuh
ANIC	Australian National Insect Collection, Canberra; Beth Mantle
BMNH	The Natural History Museum, London; Mick Webb
CAS	California Academy of Sciences, San Francisco; the late Paul Arnaud, Norman Penny
MNT	Museum of Northern Territory, Darwin; Gavin Dally
SAMA	South Australian Museum, Adelaide; the late Gordon Gross, Peter Hudson
UNSW	University of New South Wales, Sydney; Gerasimos Cassis
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington, DC, Thomas J. Henry
WAMP	Western Australian Museum, Perth; Terry Houston, Nikolai Tatarnic
ZISP	Zoological Institute, Russian Academy of Sciences, St. Petersburg; the late I. M. Kerzhner, Fedor Konstantinov, Dimitri Gapon.

TAXONOMY OF AUSTRALIAN CREMNORRHININA

Cremnorrhinina Reuter

Cremnorrhinaria Reuter, 1883: 567 (descr.).
Cremnorrhinini Wagner, 1974: 367 (descr.).
Cremnorrhini [sic] Schuh and Menard, 2013: 21 (status); Menard et al., 2014: 407 (com position and relationships).
Cremnorrhina [sic] Schuh and Menard, 2013: 21 (as subtribe); Menard et al., 2014: 407 (composition and relationships).

DIAGNOSIS: Recognized by the elongate pulvilli (fig. 31E, F), in the Australian fauna unique in always having these structures free from the claw except at the base and extending to the apex of the claw. Usually with moderate sexual dimorphism, female shorter and more strongly ovoid than male, weakly to strongly brachypterous. Coloration ranging from almost entirely pale (pls. 8, 28), sometimes nearly white (pl. 2, 16), to almost completely black (pl. 16, 24); tibial spines usually with pale bases (e.g., pl. 12), much less frequently with dark bases (pl. 16). Head sometimes strongly prognathous and elongate (pl. 26), although usually with face short to very short (e.g., pls. 22, 28). Head below eyes never more than one-half height of head to as little as one-fifth (figs. 8B, 45B). Antenna usually with segments 2, 3, and 4 slender, 3 and 4 of more or less equal diameter (e.g., pls. 26, 28), segment 2 occasionally swollen and terete (pl. 24); antennal sexual dimorphism weak, segment 2 in male sometimes more robust than in female. Pronotum usually flattened, trapezoidal, lateral margins ranging from weakly concave to weakly convex, posterior lobe sometimes moderately swollen and elevated; calli ranging from inconspicuous to distinctly demarcated; mesoscutum narrowly to broadly exposed; scutellum in form of equilateral triangle, flattened or very weakly elevated. Male genitalia typical for the Phylinae in structure of phallotheca, left and right parameres; endosoma, formed of two distinct straps, ranging from very slender and long to short and compact, J-shaped or sigmoid, sometimes with one or two lateral spines arising near secondary gonopore, apex with one, two, or three spines of various shapes and lengths and sometimes with a membranous baglike structure, frequently ornamented with microtrichia or denticles. Structure of female genitalia typical for phylines with subgenital plate of sternite 6 variable, usually concave medially, sometimes with posteriorly

TABLE 1
Measurements of Australian Cremnorrhinina

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
Adunatiphylus																
A. kalbarri																
♂ (*N* = 5)	**Mean**	**3.09**	**2.00**	**0.20**	**0.33**	**0.30**	**0.63**	**0.63**	**0.80**	**0.38**	**0.30**	**0.88**	**1.38**	**0.47**	**0.80**	**0.26**
	SD	0.18	0.06	0.02	0.01	0.02	0.04	0.02	0.04	0.02	0.01	0.03	0.05	0.01	0.02	0.01
	Range	0.44	0.15	0.06	0.04	0.04	0.09	0.06	0.10	0.05	0.02	0.07	0.13	0.02	0.05	0.02
	Min	2.79	1.91	0.17	0.32	0.27	0.58	0.60	0.75	0.36	0.29	0.85	1.31	0.46	0.78	0.25
	Max	3.23	2.06	0.23	0.36	0.31	0.67	0.66	0.85	0.41	0.31	0.92	1.45	0.48	0.83	0.27
♀ (*N* = 5)	**Mean**	**2.51**	**1.77**	**0.23**	**0.33**	**0.27**	**0.42**	**0.65**	**0.78**	**0.35**	**0.35**	**0.73**	**1.12**	**0.54**	**0.84**	**0.31**
	SD	0.11	0.06	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.01	0.02
	Range	0.30	0.16	0.04	0.02	0.02	0.05	0.02	0.04	0.04	0.03	0.07	0.08	0.04	0.02	0.04
	Min	2.37	1.69	0.21	0.32	0.26	0.39	0.64	0.76	0.33	0.33	0.70	1.09	0.51	0.82	0.29
	Max	2.67	1.85	0.25	0.34	0.28	0.44	0.66	0.80	0.37	0.36	0.77	1.17	0.55	0.84	0.33
Asterophylus																
A. chrysocephali																
♂ (*N* = 7)	**Mean**	**3.53**	**2.31**	**0.23**	**0.39**	**0.34**	**0.67**	**0.68**	**0.89**	**0.45**	**0.29**	**1.03**	**1.50**	**0.43**	**0.77**	**0.25**
	SD	0.29	0.13	0.03	0.03	0.03	0.08	0.03	0.06	0.04	0.02	0.08	0.07	0.04	0.01	0.01
	Range	0.83	0.37	0.07	0.09	0.07	0.26	0.10	0.18	0.10	0.05	0.23	0.22	0.12	0.05	0.03
	Min	2.96	2.07	0.20	0.35	0.30	0.50	0.63	0.80	0.39	0.27	0.87	1.38	0.37	0.74	0.24
	Max	3.79	2.44	0.27	0.44	0.37	0.76	0.73	0.98	0.49	0.32	1.10	1.60	0.49	0.79	0.27
♀ (*N* = 7)	**Mean**	**3.17**	**2.17**	**0.24**	**0.39**	**0.32**	**0.53**	**0.68**	**0.91**	**0.45**	**0.35**	**0.93**	**1.36**	**0.52**	**0.75**	**0.29**
	SD	0.16	0.13	0.03	0.03	0.01	0.04	0.03	0.03	0.02	0.01	0.06	0.05	0.02	0.01	0.01
	Range	0.48	0.43	0.09	0.08	0.04	0.12	0.08	0.09	0.06	0.03	0.18	0.13	0.05	0.03	0.02
	Min	2.84	1.91	0.20	0.35	0.30	0.46	0.63	0.85	0.42	0.34	0.82	1.30	0.49	0.73	0.28
	Max	3.32	2.34	0.29	0.43	0.34	0.58	0.71	0.94	0.48	0.37	1.00	1.43	0.54	0.76	0.30
A. rutidosis																
♂ (*N* = 7)	**Mean**	**3.12**	**2.04**	**0.23**	**0.34**	**0.30**	**0.59**	**0.66**	**0.83**	**0.40**	**0.30**	**0.92**	**1.38**	**0.46**	**0.79**	**0.27**
	SD	0.53	0.27	0.02	0.02	0.03	0.13	0.04	0.06	0.04	0.01	0.14	0.14	0.04	0.02	0.03
	Range	1.32	0.67	0.04	0.05	0.08	0.32	0.10	0.14	0.10	0.03	0.37	0.36	0.10	0.05	0.07
	Min	2.50	1.71	0.21	0.31	0.25	0.44	0.61	0.76	0.35	0.29	0.71	1.16	0.42	0.77	0.23
	Max	3.82	2.38	0.25	0.36	0.33	0.76	0.71	0.90	0.45	0.32	1.08	1.52	0.52	0.82	0.30
♀ (*N* = 8)	**Mean**	**2.63**	**1.92**	**0.25**	**0.34**	**0.27**	**0.41**	**0.68**	**0.83**	**0.40**	**0.37**	**0.87**	**1.26**	**0.55**	**0.82**	**0.32**
	SD	0.38	0.20	0.03	0.03	0.02	0.13	0.03	0.05	0.04	0.01	0.05	0.06	0.03	0.04	0.03
	Range	0.97	0.52	0.08	0.08	0.06	0.35	0.09	0.15	0.10	0.03	0.14	0.20	0.09	0.11	0.08
	Min	2.22	1.68	0.21	0.29	0.25	0.26	0.62	0.76	0.36	0.36	0.77	1.12	0.51	0.76	0.28
	Max	3.19	2.20	0.29	0.37	0.31	0.61	0.71	0.91	0.46	0.39	0.91	1.32	0.60	0.87	0.35

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
Austroplagiognathus																
A. arbustoides																
♂ (**N = 1**)		5.70	3.50	0.25	0.60	0.59	1.16	0.91	1.38	0.74	0.35	1.50	1.66	0.39	0.66	0.24
A. paralellus																
♂ (**N = 1**)		4.10	2.60	0.28	0.45	0.43	0.75	0.68	0.98	0.54	0.30	1.19	1.74	0.44	0.70	0.24
Bifidostylus																
B. agnew																
♂ (**N = 5**)	**Mean**	**4.34**	**2.75**	**0.24**	**0.45**	**0.40**	**0.91**	**0.71**	**1.03**	**0.51**	**0.30**	**1.14**	**1.61**	**0.42**	**0.69**	**0.24**
	SD	0.19	0.13	0.01	0.04	0.02	0.07	0.02	0.05	0.03	0.01	0.04	0.07	0.01	0.03	0.01
	Range	0.52	0.36	0.03	0.08	0.04	0.18	0.05	0.13	0.07	0.01	0.10	0.20	0.02	0.07	0.01
	Min	4.10	2.62	0.23	0.42	0.39	0.83	0.69	0.98	0.48	0.29	1.08	1.49	0.41	0.67	0.23
	Max	4.62	2.98	0.26	0.50	0.43	1.01	0.74	1.11	0.55	0.30	1.18	1.69	0.43	0.74	0.24
♀ (**N = 5**)	**Mean**	**3.59**	**2.51**	**0.26**	**0.42**	**0.37**	**0.66**	**0.70**	**0.98**	**0.48**	**0.36**	**1.08**	**1.55**	**0.51**	**0.71**	**0.27**
	SD	0.15	0.12	0.03	0.02	0.02	0.05	0.02	0.04	0.03	0.01	0.05	0.05	0.01	0.02	0.01
	Range	0.40	0.31	0.08	0.05	0.04	0.11	0.04	0.11	0.08	0.02	0.13	0.14	0.02	0.05	0.01
	Min	3.35	2.30	0.23	0.40	0.36	0.58	0.68	0.91	0.43	0.35	1.00	1.47	0.50	0.69	0.27
	Max	3.75	2.61	0.31	0.45	0.40	0.69	0.72	1.02	0.51	0.37	1.13	1.61	0.52	0.74	0.28
B. cassisi																
♂ (**N = 5**)	**Mean**	**3.55**	**2.30**	**0.22**	**0.38**	**0.34**	**0.65**	**0.68**	**0.87**	**0.42**	**0.30**	**1.07**	**1.57**	**0.43**	**0.79**	**0.25**
	SD	0.17	0.07	0.01	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.07	0.06	0.01	0.02	0.01
	Range	0.41	0.18	0.03	0.06	0.05	0.08	0.07	0.08	0.07	0.02	0.16	0.15	0.04	0.05	0.02
	Min	3.34	2.25	0.21	0.35	0.31	0.61	0.65	0.85	0.38	0.29	1.03	1.51	0.41	0.76	0.24
	Max	3.75	2.43	0.24	0.41	0.36	0.69	0.72	0.93	0.45	0.31	1.19	1.66	0.45	0.81	0.26
♀ (**N = 5**)	**Mean**	**3.31**	**2.25**	**0.26**	**0.39**	**0.34**	**0.51**	**0.70**	**0.92**	**0.46**	**0.36**	**1.02**	**1.44**	**0.51**	**0.76**	**0.28**
	SD	0.18	0.12	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.01	0.07	0.05	0.01	0.01	0.01
	Range	0.46	0.29	0.08	0.08	0.04	0.09	0.07	0.07	0.06	0.04	0.17	0.11	0.03	0.03	0.02
	Min	3.11	2.09	0.21	0.34	0.32	0.47	0.67	0.89	0.43	0.34	0.94	1.39	0.50	0.75	0.27
	Max	3.57	2.38	0.29	0.42	0.36	0.56	0.74	0.96	0.49	0.38	1.11	1.50	0.53	0.78	0.29
B. finalis																
♂ (**N = 1**)		**3.58**	**2.35**	**0.28**	**0.43**	**0.35**	**0.79**	**0.65**	**0.93**	**0.44**	**0.30**	**0.94**	**1.44**	**0.46**	**0.70**	**0.26**
B. gawlerensis																
♂ (**N = 1**)		**4.28**	**3.00**	**0.28**	**0.60**	**0.54**	**0.75**	**0.91**	**1.23**	**0.57**	**0.29**	**1.45**	**1.59**	**0.32**	**0.74**	**0.29**
♀ (**N = 1**)		**3.94**	**2.69**	**0.26**	**0.55**	**0.49**	**0.68**	**0.93**	**1.19**	**0.59**	**0.41**	**1.16**	**1.25**	**0.44**	**0.78**	**0.30**
B. gilesi																
♂ (**N = 5**)	**Mean**	**3.06**	**2.02**	**0.24**	**0.40**	**0.34**	**0.52**	**0.69**	**0.85**	**0.42**	**0.27**	**0.98**	**1.43**	**0.40**	**0.81**	**0.28**
	SD	0.08	0.05	0.02	0.02	0.01	0.03	0.01	0.02	0.01	0.01	0.03	0.05	0.01	0.03	0.01

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Range	0.19	0.12	0.04	0.05	0.04	0.06	0.03	0.05	0.04	0.03	0.07	0.11	0.03	0.06	0.02
	Min	2.96	1.96	0.21	0.37	0.32	0.49	0.68	0.83	0.40	0.26	0.94	1.36	0.38	0.78	0.27
	Max	3.15	2.08	0.25	0.42	0.36	0.55	0.71	0.88	0.44	0.29	1.01	1.47	0.41	0.84	0.29
♀ (*N* = 5)	**Mean**	**3.03**	**2.02**	**0.19**	**0.39**	**0.32**	**0.51**	**0.68**	**0.89**	**0.42**	**0.34**	**0.91**	**1.33**	**0.50**	**0.77**	**0.29**
	SD	0.10	0.07	0.03	0.02	0.01	0.01	0.01	0.05	0.02	0.01	0.02	0.01	0.01	0.03	0.02
	Range	0.26	0.17	0.07	0.04	0.02	0.03	0.03	0.12	0.06	0.03	0.04	0.03	0.02	0.08	0.04
	Min	2.87	1.92	0.15	0.37	0.31	0.50	0.67	0.85	0.39	0.33	0.89	1.31	0.49	0.72	0.27
	Max	3.13	2.09	0.22	0.41	0.33	0.53	0.70	0.97	0.45	0.36	0.93	1.34	0.51	0.80	0.31
B. kalgoorlie																
♂ (*N* = 5)	**Mean**	**3.79**	**2.40**	**0.21**	**0.40**	**0.38**	**0.75**	**0.70**	**0.94**	**0.45**	**0.30**	**1.19**	**1.70**	**0.43**	**0.74**	**0.25**
	SD	0.20	0.09	0.03	0.02	0.01	0.02	0.02	0.03	0.03	0.01	0.03	0.02	0.01	0.02	0.01
	Range	0.51	0.17	0.06	0.05	0.02	0.04	0.04	0.08	0.06	0.01	0.08	0.06	0.02	0.05	0.04
	Min	3.44	2.33	0.17	0.38	0.37	0.74	0.69	0.91	0.43	0.30	1.16	1.68	0.42	0.71	0.23
	Max	3.95	2.50	0.23	0.43	0.39	0.78	0.73	0.99	0.49	0.31	1.24	1.74	0.44	0.76	0.27
♀ (*N* = 2)	**Mean**	**2.99**	**2.02**	**0.19**	**0.37**	**0.33**	**0.49**	**0.72**	**0.98**	**0.46**	**0.37**	**1.00**	**1.39**	**0.51**	**0.73**	**0.33**
	SD	0.07	0.03	0.03	0.02	0.00	0.03	0.00	0.02	0.01	0.00	0.02	0.02	0.00	0.01	0.01
	Range	0.09	0.04	0.05	0.02	0.00	0.05	0.00	0.03	0.01	0.01	0.02	0.02	0.00	0.02	0.02
	Min	2.95	2.00	0.17	0.36	0.33	0.46	0.72	0.97	0.46	0.36	0.99	1.38	0.51	0.72	0.32
	Max	3.04	2.04	0.22	0.38	0.33	0.51	0.72	1.00	0.47	0.37	1.01	1.40	0.51	0.74	0.34
B. newmanensis																
♂ (*N* = 4)	**Mean**	**3.53**	**2.36**	**0.21**	**0.45**	**0.40**	**0.61**	**0.90**	**1.05**	**0.50**	**0.36**	**1.06**	**1.18**	**0.40**	**0.86**	**0.30**
	SD	0.11	0.06	0.02	0.02	0.01	0.03	0.02	0.03	0.01	0.02	0.06	0.09	0.02	0.03	0.02
	Range	0.27	0.13	0.04	0.04	0.02	0.08	0.04	0.06	0.03	0.06	0.11	0.17	0.04	0.07	0.03
	Min	3.41	2.27	0.20	0.43	0.39	0.58	0.88	1.03	0.48	0.33	1.02	1.12	0.38	0.83	0.28
	Max	3.68	2.40	0.24	0.47	0.41	0.66	0.92	1.09	0.51	0.39	1.13	1.29	0.42	0.90	0.31
♀ (*N* = 4)	**Mean**	**3.32**	**2.25**	**0.23**	**0.46**	**0.37**	**0.58**	**0.85**	**1.00**	**0.51**	**0.44**	**1.01**	**1.18**	**0.52**	**0.85**	**0.30**
	SD	0.11	0.07	0.01	0.03	0.01	0.04	0.02	0.03	0.00	0.01	0.03	0.04	0.01	0.03	0.01
	Range	0.27	0.14	0.02	0.07	0.01	0.08	0.04	0.07	0.01	0.02	0.07	0.07	0.03	0.08	0.03
	Min	3.18	2.21	0.22	0.42	0.37	0.53	0.83	0.97	0.51	0.43	0.98	1.13	0.50	0.81	0.29
	Max	3.45	2.35	0.24	0.49	0.38	0.61	0.87	1.04	0.52	0.45	1.05	1.20	0.53	0.89	0.32
B. occidentalis																
♂ (*N* = 5)	**Mean**	**4.85**	**3.10**	**0.29**	**0.51**	**0.47**	**0.97**	**0.93**	**1.14**	**0.59**	**0.40**	**1.40**	**1.51**	**0.44**	**0.81**	**0.23**
	SD	0.25	0.09	0.02	0.02	0.02	0.04	0.02	0.03	0.03	0.02	0.04	0.02	0.02	0.01	0.01
	Range	0.68	0.24	0.05	0.06	0.06	0.12	0.05	0.09	0.07	0.04	0.08	0.04	0.05	0.03	0.01
	Min	4.47	2.97	0.27	0.47	0.44	0.91	0.90	1.08	0.56	0.38	1.35	1.50	0.41	0.80	0.23

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Max	5.15	3.21	0.32	0.53	0.50	1.03	0.95	1.17	0.63	0.42	1.43	1.54	0.46	0.83	0.24
♀ (*N* = 5)	**Mean**	**4.35**	**2.91**	**0.31**	**0.53**	**0.46**	**0.75**	**0.94**	**1.18**	**0.60**	**0.47**	**1.29**	**1.37**	**0.50**	**0.80**	**0.27**
	SD	0.13	0.11	0.01	0.02	0.02	0.04	0.01	0.04	0.02	0.01	0.05	0.04	0.01	0.02	0.01
	Range	0.32	0.28	0.02	0.06	0.04	0.08	0.03	0.10	0.06	0.02	0.12	0.10	0.02	0.04	0.02
	Min	4.19	2.80	0.30	0.49	0.44	0.71	0.92	1.12	0.58	0.46	1.24	1.34	0.49	0.78	0.26
	Max	4.51	3.08	0.32	0.55	0.48	0.79	0.95	1.22	0.64	0.48	1.36	1.44	0.51	0.82	0.28
B. omnivorus																
♂ (*N* = 6)	**Mean**	**3.33**	**2.20**	**0.22**	**0.38**	**0.39**	**0.55**	**0.75**	**0.94**	**0.49**	**0.27**	**0.84**	**1.12**	**0.37**	**0.80**	**0.28**
	SD	0.14	0.09	0.01	0.03	0.03	0.05	0.03	0.08	0.04	0.02	0.02	0.06	0.02	0.05	0.02
	Range	0.35	0.28	0.03	0.07	0.07	0.13	0.07	0.17	0.08	0.05	0.05	0.15	0.04	0.11	0.07
	Min	3.14	2.05	0.20	0.34	0.34	0.48	0.71	0.83	0.44	0.25	0.82	1.06	0.35	0.75	0.24
	Max	3.49	2.33	0.23	0.41	0.41	0.61	0.78	1.00	0.52	0.30	0.87	1.21	0.39	0.86	0.31
♀ (*N* = 6)	**Mean**	**3.19**	**2.14**	**0.22**	**0.39**	**0.37**	**0.53**	**0.73**	**0.96**	**0.48**	**0.34**	**0.74**	**1.02**	**0.48**	**0.76**	**0.30**
	SD	0.16	0.12	0.03	0.04	0.02	0.02	0.03	0.08	0.03	0.02	0.04	0.05	0.01	0.04	0.01
	Range	0.37	0.30	0.07	0.09	0.05	0.06	0.08	0.21	0.09	0.04	0.08	0.14	0.02	0.10	0.04
	Min	2.97	1.97	0.20	0.34	0.34	0.50	0.67	0.82	0.43	0.32	0.70	0.95	0.47	0.72	0.28
	Max	3.34	2.27	0.27	0.43	0.39	0.56	0.75	1.03	0.52	0.36	0.78	1.09	0.49	0.82	0.32
B. silverae																
♂ (*N* = 6)	**Mean**	**3.17**	**2.09**	**0.20**	**0.39**	**0.34**	**0.58**	**0.70**	**0.89**	**0.44**	**0.26**	**0.95**	**1.35**	**0.37**	**0.79**	**0.28**
	SD	0.09	0.06	0.03	0.03	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.05	0.02	0.01	0.01
	Range	0.25	0.17	0.07	0.07	0.03	0.07	0.03	0.04	0.05	0.04	0.06	0.15	0.05	0.03	0.02
	Min	3.05	2.00	0.17	0.34	0.33	0.54	0.69	0.88	0.42	0.25	0.92	1.27	0.36	0.77	0.27
	Max	3.30	2.17	0.24	0.41	0.36	0.61	0.72	0.92	0.47	0.29	0.98	1.42	0.41	0.80	0.29
♀ (*N* = 7)	**Mean**	**3.08**	**2.05**	**0.21**	**0.39**	**0.34**	**0.55**	**0.69**	**0.91**	**0.45**	**0.34**	**0.84**	**1.21**	**0.49**	**0.76**	**0.30**
	SD	0.09	0.05	0.03	0.02	0.01	0.03	0.01	0.03	0.02	0.01	0.05	0.07	0.01	0.02	0.01
	Range	0.26	0.15	0.08	0.04	0.03	0.07	0.03	0.08	0.05	0.03	0.15	0.19	0.03	0.06	0.04
	Min	2.99	1.95	0.17	0.37	0.32	0.51	0.67	0.88	0.42	0.33	0.76	1.12	0.48	0.72	0.28
	Max	3.25	2.10	0.25	0.41	0.35	0.58	0.70	0.96	0.47	0.36	0.91	1.31	0.51	0.78	0.32
Dicyphylus																
D. beaglensis																
♂ (*N* = 1)		**2.65**	**1.80**	**0.19**	**0.31**	**0.28**	**0.45**	**0.54**	**0.71**	**0.35**	**0.26**	**0.96**	**1.79**	**0.48**	**0.75**	**0.27**
♀ (*N* = 5)	**Mean**	**2.68**	**1.89**	**0.25**	**0.34**	**0.28**	**0.42**	**0.56**	**0.76**	**0.36**	**0.30**	**0.96**	**1.73**	**0.54**	**0.73**	**0.28**
	SD	0.09	0.05	0.02	0.01	0.02	0.03	0.02	0.02	0.02	0.01	0.06	0.07	0.02	0.02	0.01
	Range	0.25	0.13	0.05	0.03	0.05	0.06	0.03	0.06	0.05	0.02	0.15	0.19	0.05	0.06	0.02
	Min	2.54	1.81	0.22	0.32	0.25	0.39	0.54	0.73	0.33	0.29	0.89	1.64	0.52	0.69	0.27

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Max	2.79	1.94	0.27	0.35	0.30	0.45	0.57	0.79	0.38	0.31	1.04	1.83	0.57	0.75	0.29
D. brachyscome																
♂ (*N* = 5)	**Mean**	**2.42**	**1.67**	**0.18**	**0.30**	**0.25**	**0.41**	**0.51**	**0.72**	**0.35**	**0.25**	**0.76**	**1.48**	**0.48**	**0.71**	**0.30**
	SD	0.08	0.06	0.03	0.02	0.02	0.02	0.01	0.03	0.01	0.01	0.04	0.09	0.02	0.03	0.01
	Range	0.22	0.14	0.06	0.05	0.04	0.05	0.03	0.06	0.01	0.03	0.10	0.24	0.05	0.07	0.02
	Min	2.32	1.60	0.15	0.28	0.23	0.39	0.50	0.70	0.34	0.23	0.71	1.38	0.46	0.67	0.29
	Max	2.54	1.74	0.21	0.33	0.27	0.44	0.53	0.76	0.35	0.26	0.81	1.62	0.51	0.74	0.31
♀ (*N* = 6)	**Mean**	**2.40**	**1.64**	**0.15**	**0.29**	**0.25**	**0.40**	**0.49**	**0.74**	**0.35**	**0.26**	**0.67**	**1.36**	**0.53**	**0.66**	**0.31**
	SD	0.07	0.04	0.03	0.03	0.01	0.02	0.02	0.04	0.02	0.01	0.03	0.08	0.02	0.03	0.02
	Range	0.16	0.11	0.08	0.07	0.02	0.04	0.04	0.10	0.05	0.02	0.09	0.20	0.06	0.08	0.05
	Min	2.32	1.58	0.12	0.25	0.24	0.37	0.47	0.70	0.33	0.25	0.63	1.28	0.50	0.61	0.28
	Max	2.48	1.69	0.20	0.32	0.26	0.41	0.51	0.80	0.38	0.27	0.72	1.48	0.56	0.69	0.33
D. halganii																
♂ (*N* = 6)	**Mean**	**3.01**	**1.91**	**0.22**	**0.31**	**0.29**	**0.58**	**0.53**	**0.73**	**0.36**	**0.21**	**0.68**	**1.28**	**0.39**	**0.72**	**0.24**
	SD	0.11	0.05	0.02	0.01	0.01	0.04	0.02	0.02	0.01	0.01	0.02	0.04	0.01	0.02	0.01
	Range	0.32	0.12	0.05	0.04	0.03	0.09	0.05	0.04	0.02	0.01	0.04	0.09	0.03	0.04	0.02
	Min	2.84	1.88	0.19	0.28	0.28	0.55	0.51	0.72	0.35	0.20	0.66	1.24	0.38	0.70	0.23
	Max	3.16	2.00	0.24	0.32	0.31	0.64	0.56	0.76	0.37	0.21	0.70	1.33	0.41	0.74	0.25
♀ (*N* = 6)	**Mean**	**2.32**	**1.59**	**0.19**	**0.29**	**0.24**	**0.38**	**0.48**	**0.70**	**0.33**	**0.24**	**0.55**	**1.16**	**0.51**	**0.68**	**0.30**
	SD	0.10	0.05	0.01	0.01	0.01	0.04	0.01	0.02	0.01	0.01	0.03	0.06	0.01	0.02	0.01
	Range	0.28	0.16	0.04	0.04	0.02	0.11	0.03	0.06	0.03	0.01	0.07	0.13	0.04	0.05	0.02
	Min	2.24	1.54	0.17	0.27	0.23	0.35	0.46	0.68	0.32	0.24	0.52	1.08	0.49	0.66	0.29
	Max	2.52	1.70	0.21	0.31	0.25	0.46	0.49	0.74	0.35	0.25	0.59	1.21	0.53	0.71	0.31
D. pilbara																
♂ (*N* = 6)	**Mean**	**2.18**	**1.41**	**0.14**	**0.27**	**0.22**	**0.40**	**0.46**	**0.65**	**0.30**	**0.25**	**0.74**	**1.63**	**0.54**	**0.70**	**0.30**
	SD	0.07	0.05	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.03	0.02	0.02	0.00
	Range	0.18	0.14	0.03	0.03	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.09	0.04	0.04	0.01
	Min	2.10	1.34	0.12	0.25	0.21	0.39	0.45	0.64	0.29	0.24	0.73	1.58	0.52	0.67	0.29
	Max	2.28	1.48	0.15	0.28	0.23	0.41	0.47	0.68	0.31	0.26	0.75	1.67	0.56	0.71	0.30
♀ (*N* = 6)	**Mean**	**2.33**	**1.56**	**0.19**	**0.29**	**0.23**	**0.40**	**0.47**	**0.71**	**0.34**	**0.27**	**0.71**	**1.51**	**0.58**	**0.66**	**0.31**
	SD	0.10	0.07	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.06	0.02	0.02	0.01
	Range	0.25	0.17	0.07	0.04	0.02	0.04	0.02	0.05	0.04	0.03	0.05	0.16	0.06	0.04	0.03
	Min	2.20	1.48	0.15	0.27	0.22	0.38	0.46	0.68	0.33	0.26	0.68	1.42	0.55	0.64	0.29
	Max	2.45	1.65	0.22	0.31	0.24	0.42	0.48	0.73	0.37	0.29	0.73	1.58	0.61	0.68	0.32

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
D. scaveolae																
♂ (*N* = 6)	**Mean**	**2.72**	**1.94**	**0.22**	**0.33**	**0.27**	**0.47**	**0.54**	**0.78**	**0.38**	**0.25**	**0.90**	**1.67**	**0.47**	**0.69**	**0.29**
	SD	0.05	0.05	0.01	0.01	0.01	0.02	0.02	0.04	0.02	0.01	0.03	0.06	0.01	0.02	0.02
	Range	0.11	0.13	0.03	0.02	0.03	0.05	0.05	0.09	0.05	0.01	0.07	0.14	0.04	0.06	0.04
	Min	2.67	1.84	0.20	0.32	0.25	0.44	0.51	0.76	0.36	0.25	0.87	1.60	0.45	0.65	0.28
	Max	2.78	1.97	0.23	0.34	0.28	0.49	0.56	0.85	0.41	0.26	0.94	1.74	0.49	0.71	0.32
♀ (*N* = 7)	**Mean**	**2.83**	**1.98**	**0.22**	**0.35**	**0.29**	**0.49**	**0.54**	**0.84**	**0.40**	**0.27**	**0.86**	**1.60**	**0.50**	**0.64**	**0.30**
	SD	0.14	0.07	0.01	0.02	0.01	0.03	0.01	0.03	0.03	0.01	0.05	0.07	0.02	0.02	0.02
	Range	0.41	0.18	0.04	0.05	0.04	0.08	0.04	0.10	0.09	0.04	0.17	0.22	0.07	0.06	0.05
	Min	2.65	1.89	0.20	0.33	0.27	0.46	0.52	0.78	0.35	0.25	0.78	1.48	0.48	0.61	0.27
	Max	3.06	2.07	0.24	0.38	0.31	0.54	0.56	0.88	0.44	0.29	0.95	1.70	0.55	0.67	0.32
D. solani																
♂ (*N* = 3)	**Mean**	**2.29**	**1.64**	**0.18**	**0.31**	**0.22**	**0.44**	**0.49**	**0.72**	**0.33**	**0.22**	**0.77**	**1.59**	**0.45**	**0.67**	**0.31**
	SD	0.07	0.10	0.00	0.01	0.02	0.04	0.02	0.01	0.01	0.01	0.06	0.10	0.01	0.02	0.01
	Range	0.13	0.18	0.01	0.02	0.04	0.08	0.04	0.02	0.01	0.02	0.12	0.18	0.01	0.04	0.01
	Min	2.25	1.57	0.18	0.30	0.20	0.39	0.46	0.71	0.32	0.21	0.72	1.48	0.45	0.65	0.31
	Max	2.38	1.75	0.19	0.32	0.24	0.47	0.50	0.73	0.33	0.23	0.84	1.66	0.46	0.69	0.32
♀ (*N* = 5)	**Mean**	**2.55**	**1.83**	**0.25**	**0.33**	**0.25**	**0.46**	**0.51**	**0.76**	**0.36**	**0.24**	**0.68**	**1.33**	**0.46**	**0.67**	**0.30**
	SD	0.11	0.06	0.02	0.01	0.01	0.04	0.01	0.03	0.01	0.01	0.05	0.09	0.01	0.02	0.01
	Range	0.28	0.16	0.07	0.03	0.02	0.09	0.03	0.06	0.03	0.02	0.14	0.22	0.03	0.05	0.03
	Min	2.38	1.73	0.22	0.31	0.24	0.41	0.50	0.73	0.34	0.23	0.61	1.22	0.44	0.65	0.28
	Max	2.66	1.89	0.29	0.34	0.26	0.50	0.53	0.79	0.37	0.25	0.75	1.44	0.47	0.70	0.31
Eremotylus																
E. betoota																
♂ (*N* = 5)	**Mean**	**3.00**	**1.97**	**0.19**	**0.36**	**0.32**	**0.54**	**0.66**	**0.81**	**0.40**	**0.30**	**0.80**	**1.22**	**0.45**	**0.81**	**0.27**
	SD	0.14	0.05	0.05	0.01	0.03	0.02	0.03	0.02	0.01	0.01	0.06	0.06	0.01	0.03	0.02
	Range	0.34	0.13	0.12	0.03	0.07	0.05	0.06	0.04	0.02	0.02	0.15	0.15	0.04	0.08	0.04
	Min	2.83	1.90	0.15	0.35	0.28	0.51	0.63	0.79	0.39	0.29	0.73	1.15	0.43	0.76	0.25
	Max	3.17	2.03	0.27	0.38	0.35	0.56	0.69	0.83	0.41	0.31	0.88	1.30	0.47	0.84	0.29
♀ (*N* = 5)	**Mean**	**2.80**	**1.90**	**0.23**	**0.36**	**0.30**	**0.46**	**0.68**	**0.85**	**0.42**	**0.35**	**0.82**	**1.20**	**0.52**	**0.80**	**0.30**
	SD	0.13	0.07	0.03	0.02	0.02	0.04	0.02	0.02	0.02	0.01	0.03	0.04	0.01	0.02	0.01
	Range	0.29	0.17	0.07	0.04	0.05	0.10	0.05	0.06	0.04	0.01	0.08	0.10	0.02	0.04	0.03
	Min	2.64	1.79	0.20	0.35	0.27	0.42	0.66	0.82	0.40	0.35	0.77	1.17	0.51	0.78	0.29
	Max	2.93	1.96	0.27	0.39	0.32	0.52	0.71	0.88	0.44	0.36	0.85	1.27	0.53	0.82	0.32
E. glaber																
♂ (*N* = 3)	**Mean**	**3.40**	**2.14**	**0.18**	**0.35**	**0.32**	**0.66**	**0.65**	**0.84**	**0.42**	**0.30**	**0.94**	**1.44**	**0.46**	**0.78**	**0.25**

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	SD	0.14	0.11	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.03	0.02	0.01
	Range	0.29	0.22	0.03	0.02	0.01	0.01	0.03	0.02	0.02	0.02	0.02	0.10	0.05	0.04	0.03
	Min	3.26	2.03	0.17	0.34	0.32	0.65	0.64	0.83	0.41	0.29	0.93	1.39	0.43	0.75	0.23
	Max	3.55	2.25	0.20	0.36	0.33	0.66	0.67	0.85	0.43	0.31	0.95	1.49	0.48	0.79	0.26
♀ (*N* = 2)	**Mean**	**3.29**	**2.25**	**0.28**	**0.43**	**0.36**	**0.55**	**0.73**	**0.92**	**0.46**	**0.36**	**1.09**	**1.46**	**0.49**	**0.80**	**0.28**
	SD	0.74	0.45	0.04	0.11	0.11	0.15	0.13	0.16	0.10	0.04	0.40	0.29	0.03	0.00	0.02
	Range	1.05	0.63	0.06	0.16	0.16	0.21	0.18	0.22	0.14	0.06	0.57	0.41	0.04	0.01	0.02
	Min	2.76	1.94	0.25	0.35	0.28	0.45	0.64	0.81	0.39	0.33	0.80	1.25	0.47	0.79	0.27
	Max	3.81	2.57	0.31	0.51	0.44	0.66	0.82	1.03	0.53	0.39	1.37	1.66	0.51	0.80	0.29
E. hibbertii																
♂ (*N* = 2)	**Mean**	**3.85**	**2.73**	**0.21**	**0.43**	**0.39**	**0.65**	**0.64**	**0.96**	**0.50**	**0.32**	**1.18**	**1.83**	**0.50**	**0.67**	**0.25**
	SD	0.00	0.18	0.02	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00
	Range	0.00	0.25	0.03	0.05	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
	Min	3.85	2.60	0.20	0.41	0.38	0.64	0.64	0.96	0.50	0.32	1.18	1.83	0.50	0.67	0.25
	Max	3.85	2.85	0.23	0.46	0.41	0.65	0.64	0.96	0.50	0.33	1.18	1.84	0.50	0.67	0.25
♀ (*N* = 3)	**Mean**	**3.36**	**2.39**	**0.34**	**0.43**	**0.33**	**0.46**	**0.63**	**0.94**	**0.42**	**0.35**	**0.96**	**1.52**	**0.56**	**0.67**	**0.28**
	SD	0.23	0.15	0.04	0.02	0.01	0.04	0.03	0.04	0.03	0.01	0.03	0.02	0.01	0.01	0.02
	Range	0.46	0.29	0.07	0.04	0.02	0.07	0.05	0.08	0.05	0.02	0.06	0.05	0.03	0.03	0.03
	Min	3.12	2.23	0.30	0.42	0.33	0.43	0.60	0.90	0.40	0.34	0.93	1.49	0.54	0.66	0.27
	Max	3.58	2.52	0.37	0.46	0.35	0.50	0.65	0.98	0.45	0.36	0.99	1.54	0.57	0.69	0.30
E. mosmanensis																
♂ (*N* = 5)	**Mean**	**3.39**	**2.19**	**0.22**	**0.40**	**0.38**	**0.58**	**0.69**	**0.96**	**0.50**	**0.30**	**0.75**	**1.08**	**0.44**	**0.72**	**0.28**
	SD	0.22	0.12	0.03	0.02	0.02	0.06	0.02	0.03	0.05	0.02	0.05	0.06	0.03	0.01	0.01
	Range	0.47	0.29	0.06	0.03	0.04	0.14	0.04	0.08	0.11	0.04	0.11	0.15	0.08	0.03	0.03
	Min	3.18	2.07	0.19	0.38	0.36	0.53	0.67	0.91	0.45	0.28	0.71	1.02	0.39	0.71	0.27
	Max	3.65	2.36	0.25	0.41	0.40	0.67	0.71	0.99	0.56	0.32	0.82	1.17	0.47	0.74	0.30
♀ (*N* = 5)	**Mean**	**3.01**	**2.03**	**0.21**	**0.36**	**0.36**	**0.48**	**0.69**	**0.94**	**0.47**	**0.36**	**0.61**	**0.88**	**0.51**	**0.74**	**0.31**
	SD	0.25	0.15	0.01	0.03	0.03	0.03	0.03	0.09	0.05	0.01	0.08	0.07	0.01	0.03	0.01
	Range	0.60	0.35	0.03	0.06	0.08	0.08	0.09	0.21	0.12	0.04	0.20	0.16	0.02	0.07	0.02
	Min	2.82	1.91	0.20	0.34	0.33	0.45	0.66	0.88	0.44	0.34	0.55	0.83	0.50	0.69	0.30
	Max	3.42	2.26	0.23	0.40	0.41	0.53	0.75	1.09	0.56	0.38	0.75	0.99	0.52	0.76	0.32
E. stuarti																
♂ (*N* = 4)	**Mean**	**3.08**	**2.05**	**0.17**	**0.34**	**0.33**	**0.59**	**0.67**	**0.89**	**0.42**	**0.28**	**0.91**	**1.36**	**0.41**	**0.75**	**0.29**
	SD	0.05	0.04	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.05	0.00	0.02	0.01
	Range	0.11	0.09	0.01	0.05	0.02	0.03	0.05	0.04	0.02	0.03	0.04	0.11	0.01	0.03	0.02

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Min	3.01	1.99	0.17	0.32	0.32	0.57	0.64	0.87	0.41	0.26	0.90	1.30	0.41	0.73	0.28
	Max	3.12	2.08	0.18	0.37	0.34	0.60	0.69	0.91	0.43	0.29	0.94	1.41	0.42	0.76	0.30
♀ (*N* = 4)	**Mean**	**2.78**	**1.92**	**0.22**	**0.36**	**0.30**	**0.48**	**0.66**	**0.89**	**0.40**	**0.34**	**0.75**	**1.14**	**0.52**	**0.74**	**0.32**
	SD	0.08	0.04	0.02	0.01	0.01	0.03	0.01	0.04	0.01	0.01	0.04	0.06	0.01	0.02	0.02
	Range	0.16	0.08	0.05	0.02	0.02	0.06	0.03	0.08	0.02	0.01	0.09	0.15	0.02	0.04	0.04
	Min	2.72	1.88	0.20	0.35	0.28	0.46	0.64	0.84	0.39	0.34	0.72	1.07	0.51	0.73	0.30
	Max	2.88	1.96	0.25	0.37	0.30	0.52	0.67	0.92	0.41	0.35	0.81	1.22	0.53	0.77	0.34
Grandivesica																
G. agnew																
♂ (*N* = 9)	**Mean**	**2.77**	**1.84**	**0.18**	**0.33**	**0.33**	**0.45**	**0.66**	**0.88**	**0.44**	**0.34**	**0.61**	**0.92**	**0.52**	**0.74**	**0.32**
	SD	0.26	0.14	0.05	0.03	0.03	0.05	0.03	0.04	0.03	0.01	0.09	0.10	0.01	0.02	0.02
	Range	0.80	0.42	0.14	0.06	0.09	0.15	0.09	0.11	0.09	0.05	0.24	0.26	0.04	0.06	0.07
	Min	2.41	1.65	0.13	0.31	0.29	0.40	0.60	0.83	0.40	0.31	0.45	0.75	0.49	0.71	0.28
	Max	3.21	2.07	0.27	0.37	0.38	0.55	0.69	0.94	0.49	0.36	0.69	1.01	0.53	0.77	0.35
♀ (*N* = 9)	**Mean**	**2.82**	**1.89**	**0.21**	**0.35**	**0.33**	**0.44**	**0.67**	**0.91**	**0.46**	**0.35**	**0.65**	**0.96**	**0.52**	**0.74**	**0.32**
	SD	0.17	0.10	0.04	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.09	0.09	0.02	0.04	0.01
	Range	0.47	0.24	0.13	0.05	0.09	0.07	0.10	0.09	0.09	0.05	0.22	0.24	0.08	0.12	0.05
	Min	2.52	1.75	0.15	0.33	0.28	0.40	0.62	0.87	0.41	0.33	0.52	0.82	0.49	0.69	0.30
	Max	2.99	1.99	0.28	0.38	0.37	0.47	0.72	0.96	0.50	0.38	0.74	1.06	0.57	0.81	0.35
G. aurea																
♂ (*N* = 6)	**Mean**	**3.29**	**2.18**	**0.22**	**0.43**	**0.37**	**0.55**	**0.69**	**1.00**	**0.52**	**0.35**	**0.74**	**1.08**	**0.51**	**0.69**	**0.30**
	SD	0.15	0.07	0.03	0.02	0.02	0.04	0.02	0.06	0.04	0.01	0.04	0.04	0.01	0.02	0.02
	Range	0.40	0.21	0.09	0.06	0.05	0.10	0.07	0.14	0.09	0.02	0.10	0.11	0.03	0.06	0.05
	Min	3.11	2.10	0.16	0.40	0.35	0.51	0.65	0.91	0.47	0.34	0.69	1.03	0.49	0.66	0.28
	Max	3.51	2.31	0.25	0.46	0.40	0.61	0.72	1.05	0.56	0.36	0.79	1.14	0.52	0.72	0.33
♀ (*N* = 6)	**Mean**	**3.14**	**2.11**	**0.23**	**0.43**	**0.36**	**0.51**	**0.68**	**1.00**	**0.51**	**0.36**	**0.69**	**1.01**	**0.53**	**0.68**	**0.32**
	SD	0.12	0.08	0.01	0.02	0.01	0.04	0.01	0.04	0.01	0.01	0.03	0.04	0.02	0.02	0.01
	Range	0.34	0.21	0.03	0.07	0.02	0.10	0.03	0.11	0.03	0.03	0.10	0.11	0.05	0.06	0.02
	Min	3.05	2.02	0.22	0.40	0.35	0.47	0.66	0.94	0.50	0.35	0.65	0.97	0.50	0.66	0.31
	Max	3.39	2.23	0.25	0.47	0.37	0.57	0.69	1.05	0.53	0.38	0.75	1.08	0.55	0.72	0.33
G. cassisi																
♂ (*N* = 8)	**Mean**	**3.14**	**2.11**	**0.24**	**0.41**	**0.35**	**0.50**	**0.66**	**0.93**	**0.49**	**0.33**	**0.72**	**1.09**	**0.50**	**0.71**	**0.30**
	SD	0.26	0.15	0.02	0.03	0.03	0.03	0.02	0.07	0.04	0.01	0.03	0.03	0.02	0.03	0.01
	Range	0.64	0.39	0.06	0.09	0.08	0.09	0.05	0.17	0.11	0.03	0.08	0.10	0.07	0.08	0.03
	Min	2.87	1.95	0.21	0.37	0.32	0.46	0.64	0.86	0.44	0.32	0.69	1.01	0.46	0.67	0.29
	Max	3.51	2.34	0.27	0.46	0.40	0.55	0.69	1.03	0.55	0.35	0.77	1.11	0.53	0.75	0.32

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
♀ (*N* = 8)	**Mean**	**3.18**	**2.14**	**0.24**	**0.41**	**0.35**	**0.52**	**0.67**	**0.97**	**0.50**	**0.37**	**0.71**	**1.06**	**0.54**	**0.69**	**0.31**
	SD	0.11	0.08	0.03	0.03	0.03	0.02	0.02	0.07	0.03	0.01	0.03	0.04	0.01	0.03	0.01
	Range	0.33	0.24	0.09	0.09	0.09	0.06	0.07	0.19	0.09	0.04	0.10	0.13	0.03	0.08	0.03
	Min	3.03	2.03	0.21	0.38	0.31	0.49	0.65	0.90	0.46	0.35	0.67	0.99	0.53	0.65	0.29
	Max	3.36	2.27	0.30	0.47	0.40	0.55	0.72	1.09	0.55	0.39	0.77	1.12	0.56	0.73	0.32
G. kadji																
♂ (*N* = 5)	**Mean**	**3.82**	**2.62**	**0.26**	**0.46**	**0.46**	**0.66**	**0.79**	**1.20**	**0.62**	**0.35**	**0.63**	**0.80**	**0.45**	**0.65**	**0.32**
	SD	0.18	0.10	0.03	0.02	0.02	0.02	0.03	0.05	0.03	0.01	0.02	0.02	0.01	0.02	0.02
	Range	0.43	0.25	0.07	0.06	0.04	0.06	0.07	0.12	0.08	0.02	0.03	0.06	0.02	0.06	0.04
	Min	3.63	2.54	0.23	0.42	0.44	0.63	0.76	1.15	0.60	0.35	0.62	0.77	0.44	0.62	0.30
	Max	4.06	2.79	0.30	0.48	0.48	0.69	0.83	1.27	0.68	0.37	0.65	0.83	0.46	0.68	0.34
♀ (*N* = 4)	**Mean**	**3.78**	**2.62**	**0.31**	**0.47**	**0.45**	**0.58**	**0.79**	**1.17**	**0.62**	**0.39**	**0.58**	**0.73**	**0.49**	**0.67**	**0.31**
	SD	0.11	0.11	0.04	0.03	0.01	0.01	0.03	0.05	0.03	0.01	0.01	0.01	0.01	0.01	0.01
	Range	0.23	0.25	0.08	0.07	0.04	0.03	0.06	0.11	0.07	0.02	0.02	0.02	0.02	0.03	0.02
	Min	3.69	2.53	0.27	0.44	0.43	0.57	0.76	1.13	0.60	0.37	0.57	0.72	0.48	0.66	0.30
	Max	3.92	2.78	0.35	0.51	0.47	0.60	0.82	1.24	0.67	0.39	0.59	0.74	0.50	0.69	0.32
G. pilbara																
♂ (*N* = 5)	**Mean**	**3.47**	**2.28**	**0.24**	**0.43**	**0.41**	**0.63**	**0.74**	**1.06**	**0.56**	**0.28**	**0.68**	**0.92**	**0.38**	**0.70**	**0.31**
	SD	0.25	0.17	0.04	0.03	0.02	0.02	0.03	0.05	0.03	0.01	0.03	0.03	0.01	0.01	0.01
	Range	0.60	0.42	0.09	0.09	0.05	0.05	0.09	0.11	0.07	0.02	0.08	0.08	0.02	0.03	0.03
	Min	3.10	2.03	0.18	0.38	0.38	0.59	0.69	0.98	0.52	0.27	0.64	0.88	0.37	0.69	0.29
	Max	3.70	2.45	0.27	0.47	0.43	0.64	0.78	1.09	0.59	0.29	0.72	0.96	0.39	0.72	0.32
♀ (*N* = 5)	**Mean**	**3.40**	**2.27**	**0.25**	**0.45**	**0.41**	**0.59**	**0.74**	**1.09**	**0.59**	**0.33**	**0.61**	**0.82**	**0.45**	**0.68**	**0.32**
	SD	0.10	0.09	0.01	0.01	0.01	0.02	0.03	0.04	0.02	0.02	0.03	0.02	0.02	0.02	0.01
	Range	0.25	0.19	0.03	0.03	0.03	0.06	0.06	0.08	0.06	0.04	0.07	0.04	0.06	0.05	0.02
	Min	3.25	2.17	0.24	0.44	0.39	0.56	0.71	1.06	0.56	0.31	0.58	0.80	0.41	0.64	0.31
	Max	3.50	2.36	0.27	0.47	0.42	0.62	0.77	1.14	0.62	0.35	0.65	0.84	0.47	0.69	0.33
Gyrophallus																
G. darwinensis																
♂ (*N* = 5)	**Mean**	**3.64**	**2.39**	**0.21**	**0.40**	**0.41**	**0.71**	**0.79**	**0.98**	**0.52**	**0.29**	**0.91**	**1.15**	**0.36**	**0.81**	**0.27**
	SD	0.15	0.08	0.02	0.03	0.02	0.04	0.01	0.02	0.02	0.01	0.06	0.07	0.02	0.02	0.01
	Range	0.37	0.20	0.04	0.06	0.04	0.08	0.04	0.05	0.04	0.04	0.13	0.15	0.06	0.05	0.02
	Min	3.43	2.28	0.19	0.37	0.39	0.67	0.77	0.96	0.51	0.26	0.84	1.06	0.33	0.78	0.26
	Max	3.80	2.48	0.23	0.43	0.43	0.75	0.81	1.01	0.55	0.30	0.97	1.21	0.39	0.83	0.28
♀ (*N* = 5)	**Mean**	**3.11**	**2.12**	**0.22**	**0.40**	**0.36**	**0.53**	**0.77**	**0.93**	**0.49**	**0.35**	**0.67**	**0.88**	**0.45**	**0.83**	**0.30**
	SD	0.05	0.04	0.01	0.02	0.01	0.01	0.00	0.03	0.01	0.00	0.02	0.03	0.00	0.02	0.01

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Range	0.12	0.10	0.01	0.04	0.03	0.02	0.01	0.06	0.04	0.01	0.05	0.07	0.02	0.06	0.02
	Min	3.05	2.06	0.22	0.38	0.34	0.52	0.77	0.89	0.46	0.34	0.64	0.83	0.44	0.81	0.29
	Max	3.17	2.16	0.23	0.42	0.37	0.54	0.78	0.95	0.50	0.35	0.69	0.90	0.46	0.87	0.31
G. donggali																
♂ (*N* = 2)	**Mean**	**4.10**	**2.65**	**0.24**	**0.47**	**0.42**	**0.77**	**0.88**	**1.04**	**0.54**	**0.41**	**1.17**	**1.33**	**0.47**	**0.85**	**0.25**
	SD	0.07	0.14	0.11	0.04	0.00	0.03	0.02	0.07	0.00	0.01	0.03	0.01	0.01	0.04	0.01
	Range	0.10	0.19	0.16	0.06	0.01	0.04	0.02	0.10	0.00	0.02	0.05	0.01	0.01	0.06	0.02
	Min	4.05	2.55	0.16	0.44	0.42	0.75	0.87	0.99	0.54	0.40	1.14	1.32	0.46	0.82	0.24
	Max	4.15	2.74	0.32	0.50	0.43	0.79	0.89	1.09	0.54	0.42	1.19	1.33	0.47	0.88	0.26
♀ (*N* = 4)	**Mean**	**3.85**	**2.58**	**0.32**	**0.51**	**0.42**	**0.64**	**0.90**	**1.08**	**0.54**	**0.51**	**1.12**	**1.24**	**0.57**	**0.84**	**0.28**
	SD	0.15	0.04	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
	Range	0.33	0.10	0.05	0.02	0.02	0.06	0.02	0.03	0.02	0.02	0.04	0.05	0.02	0.02	0.03
	Min	3.65	2.52	0.29	0.50	0.41	0.60	0.89	1.06	0.52	0.50	1.10	1.21	0.56	0.83	0.27
	Max	3.98	2.62	0.34	0.52	0.43	0.66	0.91	1.09	0.54	0.52	1.14	1.26	0.58	0.85	0.30
G. forrestii																
♂ (*N* = 4)	**Mean**	**4.72**	**2.99**	**0.32**	**0.50**	**0.50**	**0.88**	**0.91**	**1.19**	**0.65**	**0.41**	**1.09**	**1.20**	**0.45**	**0.76**	**0.25**
	SD	0.11	0.05	0.05	0.04	0.02	0.04	0.02	0.03	0.01	0.00	0.02	0.01	0.01	0.01	0.00
	Range	0.28	0.12	0.13	0.08	0.06	0.07	0.04	0.06	0.02	0.01	0.04	0.03	0.03	0.03	0.01
	Min	4.59	2.92	0.27	0.45	0.48	0.84	0.89	1.18	0.64	0.41	1.07	1.18	0.44	0.75	0.25
	Max	4.87	3.04	0.40	0.53	0.54	0.91	0.93	1.24	0.66	0.42	1.11	1.21	0.47	0.78	0.26
♀ (*N* = 4)	**Mean**	**4.06**	**2.76**	**0.33**	**0.51**	**0.47**	**0.65**	**0.93**	**1.20**	**0.63**	**0.48**	**1.00**	**1.07**	**0.52**	**0.78**	**0.30**
	SD	0.05	0.05	0.05	0.02	0.01	0.01	0.02	0.03	0.01	0.01	0.04	0.03	0.01	0.01	0.00
	Range	0.12	0.11	0.12	0.04	0.03	0.03	0.04	0.06	0.03	0.01	0.07	0.07	0.04	0.03	0.01
	Min	4.02	2.72	0.29	0.49	0.45	0.64	0.92	1.18	0.62	0.48	0.96	1.04	0.50	0.76	0.29
	Max	4.14	2.83	0.41	0.53	0.48	0.67	0.96	1.24	0.65	0.49	1.03	1.11	0.54	0.79	0.30
G. karara																
♂ (*N* = 1)		**4.00**	**2.65**	**0.19**	**0.47**	**0.44**	**0.72**	**0.78**	**1.11**	**0.56**	**0.33**	**0.94**	**1.21**	**0.42**	**0.70**	**0.28**
G. lasseteri																
♂ (*N* = 1)		**4.83**	**3.25**	**0.20**	**0.66**	**0.63**	**0.94**	**0.96**	**1.31**	**0.68**	**0.41**	**1.34**	**1.40**	**0.43**	**0.73**	**0.27**
♀ (*N* = 3)	**Mean**	**4.70**	**3.30**	**0.36**	**0.63**	**0.54**	**0.83**	**0.98**	**1.31**	**0.67**	**0.48**	**1.32**	**1.34**	**0.49**	**0.75**	**0.28**
	SD	0.32	0.16	0.01	0.03	0.04	0.08	0.01	0.07	0.04	0.01	0.11	0.10	0.01	0.03	0.01
	Range	0.63	0.33	0.02	0.06	0.07	0.16	0.02	0.13	0.09	0.02	0.19	0.19	0.02	0.06	0.02
	Min	4.43	3.13	0.35	0.59	0.51	0.74	0.97	1.23	0.62	0.47	1.26	1.27	0.48	0.73	0.27
	Max	5.06	3.45	0.37	0.65	0.58	0.90	0.99	1.36	0.71	0.49	1.45	1.46	0.50	0.79	0.29

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
G. lochada																
♂ (*N* = 1)		**4.50**	**2.80**	**0.25**	**0.50**	**0.46**	**0.86**	**0.81**	**1.08**	**0.58**	**0.36**	**1.03**	**1.27**	**0.45**	**0.75**	**0.24**
♀ (*N* = 1)		**3.45**	**2.41**	**0.30**	**0.45**	**0.40**	**0.52**	**0.85**	**1.08**	**0.57**	**0.46**	**0.82**	**0.96**	**0.54**	**0.79**	**0.31**
G. pantonii																
♂ (*N* = 6)	**Mean**	**5.19**	**3.26**	**0.24**	**0.51**	**0.52**	**1.05**	**0.92**	**1.21**	**0.64**	**0.39**	**1.37**	**1.49**	**0.42**	**0.76**	**0.23**
	SD	0.14	0.06	0.02	0.04	0.02	0.05	0.02	0.05	0.04	0.01	0.06	0.07	0.02	0.03	0.01
	Range	0.35	0.15	0.04	0.09	0.05	0.12	0.06	0.13	0.09	0.03	0.15	0.18	0.06	0.08	0.02
	Min	5.03	3.20	0.22	0.47	0.50	0.99	0.88	1.17	0.59	0.37	1.29	1.38	0.40	0.72	0.22
	Max	5.38	3.35	0.26	0.56	0.55	1.11	0.94	1.30	0.68	0.40	1.44	1.56	0.46	0.80	0.24
♀ (*N* = 5)	**Mean**	**4.33**	**2.91**	**0.32**	**0.53**	**0.48**	**0.74**	**0.95**	**1.21**	**0.62**	**0.52**	**1.16**	**1.22**	**0.55**	**0.79**	**0.28**
	SD	0.11	0.08	0.04	0.03	0.01	0.03	0.03	0.02	0.02	0.02	0.06	0.04	0.02	0.01	0.00
	Range	0.28	0.21	0.10	0.09	0.02	0.07	0.05	0.05	0.05	0.05	0.15	0.10	0.06	0.04	0.02
	Min	4.21	2.81	0.27	0.49	0.47	0.70	0.93	1.19	0.60	0.49	1.07	1.15	0.52	0.77	0.27
	Max	4.49	3.02	0.37	0.58	0.49	0.77	0.98	1.24	0.65	0.54	1.22	1.25	0.58	0.81	0.29
G. symondsae																
♂ (*N* = 6)	**Mean**	**4.97**	**3.11**	**0.28**	**0.51**	**0.49**	**1.07**	**0.85**	**1.14**	**0.61**	**0.37**	**1.26**	**1.47**	**0.43**	**0.75**	**0.23**
	SD	0.34	0.19	0.04	0.07	0.02	0.06	0.03	0.06	0.04	0.02	0.10	0.09	0.01	0.03	0.01
	Range	0.89	0.51	0.12	0.19	0.07	0.18	0.08	0.18	0.10	0.05	0.29	0.23	0.04	0.09	0.02
	Min	4.67	2.93	0.23	0.43	0.47	1.01	0.82	1.07	0.57	0.34	1.07	1.30	0.41	0.70	0.22
	Max	5.56	3.44	0.35	0.62	0.54	1.19	0.90	1.25	0.67	0.39	1.36	1.53	0.45	0.79	0.24
♀ (*N* = 5)	**Mean**	**4.14**	**2.75**	**0.29**	**0.48**	**0.44**	**0.76**	**0.84**	**1.09**	**0.58**	**0.43**	**1.10**	**1.32**	**0.52**	**0.77**	**0.26**
	SD	0.18	0.11	0.03	0.02	0.02	0.05	0.02	0.04	0.01	0.01	0.07	0.05	0.02	0.02	0.01
	Range	0.47	0.25	0.07	0.04	0.04	0.11	0.06	0.08	0.04	0.03	0.17	0.14	0.04	0.03	0.03
	Min	3.84	2.61	0.26	0.46	0.42	0.70	0.80	1.07	0.56	0.42	1.00	1.25	0.50	0.75	0.25
	Max	4.31	2.86	0.33	0.50	0.46	0.81	0.86	1.15	0.60	0.45	1.17	1.39	0.54	0.78	0.28
Halophylus																
H. atriplicis																
♂ (*N* = 5)	**Mean**	**3.18**	**2.22**	**0.23**	**0.41**	**0.36**	**0.50**	**0.87**	**1.01**	**0.50**	**0.43**	**1.11**	**1.28**	**0.50**	**0.86**	**0.32**
	SD	0.12	0.07	0.02	0.01	0.01	0.02	0.03	0.06	0.02	0.02	0.05	0.04	0.01	0.02	0.02
	Range	0.31	0.18	0.05	0.04	0.03	0.05	0.08	0.14	0.05	0.06	0.12	0.09	0.02	0.06	0.05
	Min	3.07	2.13	0.21	0.40	0.34	0.47	0.83	0.96	0.48	0.41	1.06	1.24	0.49	0.83	0.30
	Max	3.38	2.31	0.26	0.44	0.37	0.52	0.91	1.10	0.53	0.47	1.18	1.33	0.51	0.89	0.35
♀ (*N* = 5)	**Mean**	**2.87**	**2.07**	**0.24**	**0.40**	**0.35**	**0.46**	**0.87**	**1.03**	**0.52**	**0.49**	**0.97**	**1.11**	**0.56**	**0.84**	**0.36**
	SD	0.14	0.18	0.03	0.03	0.01	0.03	0.04	0.07	0.04	0.01	0.03	0.05	0.02	0.03	0.02
	Range	0.35	0.46	0.07	0.07	0.03	0.06	0.11	0.17	0.09	0.02	0.07	0.13	0.03	0.07	0.05
	Min	2.74	1.81	0.20	0.37	0.34	0.43	0.81	0.94	0.48	0.48	0.93	1.07	0.55	0.82	0.34
	Max	3.09	2.27	0.27	0.44	0.37	0.49	0.92	1.11	0.57	0.50	1.00	1.20	0.58	0.89	0.39

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
H. chenopodos																
♂ (*N* = 7)	**Mean**	**3.34**	**2.30**	**0.23**	**0.43**	**0.39**	**0.52**	**0.83**	**1.04**	**0.51**	**0.42**	**1.06**	**1.28**	**0.51**	**0.79**	**0.31**
	SD	0.12	0.09	0.03	0.02	0.01	0.05	0.01	0.05	0.02	0.01	0.03	0.04	0.02	0.04	0.01
	Range	0.29	0.25	0.08	0.06	0.04	0.14	0.05	0.14	0.05	0.03	0.07	0.10	0.05	0.13	0.04
	Min	3.19	2.15	0.21	0.40	0.37	0.49	0.80	0.99	0.49	0.40	1.03	1.23	0.48	0.71	0.29
	Max	3.48	2.40	0.29	0.46	0.41	0.63	0.85	1.13	0.54	0.43	1.10	1.33	0.53	0.84	0.33
♀ (*N* = 6)	**Mean**	**3.24**	**2.36**	**0.33**	**0.44**	**0.37**	**0.48**	**0.85**	**1.06**	**0.53**	**0.49**	**1.00**	**1.18**	**0.57**	**0.81**	**0.33**
	SD	0.13	0.11	0.06	0.02	0.02	0.04	0.02	0.05	0.02	0.02	0.05	0.06	0.02	0.03	0.01
	Range	0.36	0.28	0.15	0.07	0.04	0.12	0.06	0.13	0.06	0.04	0.12	0.13	0.04	0.08	0.03
	Min	3.04	2.21	0.27	0.40	0.34	0.44	0.82	1.00	0.50	0.47	0.95	1.10	0.55	0.77	0.30
	Max	3.40	2.49	0.42	0.47	0.38	0.56	0.87	1.13	0.56	0.51	1.07	1.23	0.59	0.85	0.33
H. maireani																
♂ (*N* = 6)	**Mean**	**3.29**	**2.24**	**0.22**	**0.42**	**0.38**	**0.51**	**0.85**	**1.02**	**0.49**	**0.43**	**1.18**	**1.40**	**0.51**	**0.83**	**0.31**
	SD	0.26	0.21	0.05	0.02	0.04	0.04	0.08	0.06	0.04	0.03	0.14	0.08	0.02	0.04	0.01
	Range	0.76	0.64	0.14	0.06	0.10	0.08	0.19	0.15	0.10	0.08	0.35	0.17	0.05	0.09	0.03
	Min	2.94	1.97	0.17	0.40	0.35	0.46	0.78	0.98	0.44	0.39	1.05	1.32	0.49	0.79	0.30
	Max	3.70	2.61	0.31	0.46	0.45	0.54	0.97	1.13	0.54	0.47	1.40	1.49	0.54	0.88	0.33
♀ (*N* = 5)	**Mean**	**3.34**	**2.48**	**0.31**	**0.46**	**0.42**	**0.48**	**0.96**	**1.14**	**0.55**	**0.53**	**1.15**	**1.19**	**0.55**	**0.85**	**0.35**
	SD	0.89	0.53	0.04	0.08	0.10	0.15	0.14	0.21	0.13	0.06	0.23	0.08	0.02	0.04	0.03
	Range	1.95	1.10	0.11	0.17	0.20	0.33	0.29	0.43	0.27	0.13	0.54	0.22	0.04	0.08	0.07
	Min	2.50	1.99	0.27	0.38	0.33	0.31	0.83	0.94	0.43	0.46	0.90	1.07	0.53	0.81	0.31
	Max	4.45	3.09	0.38	0.55	0.53	0.64	1.12	1.37	0.70	0.59	1.44	1.29	0.57	0.89	0.38
H. rhagodii																
♂ (*N* = 5)	**Mean**	**3.80**	**2.44**	**0.20**	**0.41**	**0.42**	**0.66**	**0.85**	**1.08**	**0.54**	**0.40**	**1.14**	**1.35**	**0.47**	**0.79**	**0.28**
	SD	0.32	0.20	0.02	0.04	0.03	0.07	0.02	0.08	0.05	0.03	0.08	0.08	0.03	0.05	0.01
	Range	0.70	0.47	0.05	0.11	0.07	0.15	0.04	0.16	0.13	0.08	0.18	0.20	0.08	0.10	0.03
	Min	3.44	2.20	0.18	0.37	0.38	0.59	0.83	1.01	0.48	0.37	1.05	1.25	0.44	0.73	0.26
	Max	4.14	2.67	0.23	0.48	0.45	0.74	0.87	1.17	0.61	0.45	1.23	1.45	0.52	0.83	0.29
♀ (*N* = 5)	**Mean**	**3.17**	**2.18**	**0.24**	**0.42**	**0.38**	**0.52**	**0.82**	**1.07**	**0.53**	**0.47**	**1.02**	**1.24**	**0.57**	**0.77**	**0.34**
	SD	0.08	0.12	0.03	0.05	0.03	0.04	0.03	0.07	0.03	0.02	0.06	0.03	0.01	0.02	0.01
	Range	0.19	0.25	0.06	0.11	0.07	0.09	0.08	0.14	0.08	0.05	0.15	0.08	0.01	0.06	0.03
	Min	3.08	2.06	0.20	0.37	0.36	0.46	0.78	1.01	0.50	0.44	0.95	1.21	0.57	0.74	0.32
	Max	3.27	2.31	0.26	0.48	0.43	0.55	0.86	1.15	0.58	0.49	1.10	1.29	0.58	0.80	0.35
H. salsoli																
♂ (*N* = 6)	**Mean**	**3.17**	**2.12**	**0.22**	**0.37**	**0.36**	**0.52**	**0.84**	**0.95**	**0.46**	**0.41**	**1.11**	**1.32**	**0.49**	**0.88**	**0.30**

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	SD	0.14	0.10	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.01	0.07	0.07	0.02	0.02	0.01
	Range	0.40	0.29	0.05	0.04	0.04	0.04	0.06	0.09	0.08	0.03	0.20	0.17	0.06	0.04	0.02
	Min	3.02	1.99	0.19	0.35	0.34	0.50	0.82	0.92	0.42	0.40	1.03	1.23	0.47	0.87	0.29
	Max	3.42	2.28	0.24	0.39	0.38	0.54	0.88	1.01	0.50	0.43	1.23	1.40	0.53	0.91	0.31
♀ (*N* = 5)	**Mean**	**3.14**	**2.23**	**0.26**	**0.41**	**0.39**	**0.50**	**0.83**	**1.01**	**0.51**	**0.46**	**1.02**	**1.26**	**0.55**	**0.82**	**0.32**
	SD	0.17	0.14	0.04	0.03	0.03	0.04	0.10	0.07	0.02	0.09	0.12	0.07	0.05	0.08	0.02
	Range	0.46	0.36	0.09	0.07	0.07	0.12	0.23	0.18	0.05	0.21	0.25	0.16	0.12	0.20	0.05
	Min	2.94	2.02	0.20	0.38	0.36	0.45	0.66	0.94	0.48	0.31	0.88	1.17	0.47	0.69	0.30
	Max	3.40	2.38	0.29	0.45	0.43	0.57	0.89	1.12	0.53	0.52	1.13	1.33	0.59	0.89	0.35
H. tecticornii																
♂ (*N* = 6)	**Mean**	**3.50**	**2.48**	**0.29**	**0.47**	**0.44**	**0.53**	**0.99**	**1.21**	**0.59**	**0.49**	**1.21**	**1.23**	**0.49**	**0.82**	**0.35**
	SD	0.12	0.08	0.04	0.03	0.02	0.03	0.02	0.04	0.03	0.02	0.03	0.04	0.01	0.03	0.02
	Range	0.26	0.23	0.11	0.08	0.07	0.08	0.05	0.11	0.07	0.05	0.09	0.08	0.03	0.08	0.05
	Min	3.35	2.37	0.26	0.43	0.40	0.50	0.97	1.15	0.55	0.47	1.17	1.19	0.48	0.79	0.32
	Max	3.61	2.60	0.37	0.51	0.47	0.58	1.02	1.26	0.62	0.52	1.26	1.27	0.51	0.87	0.37
♀ (*N* = 6)	**Mean**	**3.86**	**2.78**	**0.38**	**0.53**	**0.48**	**0.54**	**1.10**	**1.31**	**0.65**	**0.60**	**1.26**	**1.13**	**0.54**	**0.84**	**0.34**
	SD	0.31	0.25	0.06	0.04	0.05	0.04	0.05	0.09	0.07	0.03	0.16	0.10	0.01	0.04	0.01
	Range	0.82	0.68	0.16	0.12	0.13	0.11	0.12	0.26	0.18	0.10	0.41	0.25	0.02	0.09	0.02
	Min	3.35	2.35	0.30	0.46	0.40	0.48	1.05	1.16	0.55	0.55	1.08	1.03	0.53	0.82	0.33
	Max	4.17	3.03	0.46	0.58	0.53	0.59	1.17	1.42	0.73	0.65	1.49	1.28	0.55	0.91	0.35
Lepidophylus																
L. guttatus																
♂ (*N* = 2)	**Mean**	**2.92**	**1.99**	**0.17**	**0.40**	**0.41**	**0.43**	**0.81**	**1.03**	**0.53**	**0.48**	**0.70**	**0.86**	**0.59**	**0.79**	**0.35**
	SD	0.03	0.02	0.01	0.00	0.00	0.01	0.02	0.06	0.00	0.01	0.01	0.00	0.00	0.03	0.02
	Range	0.04	0.02	0.01	0.00	0.00	0.01	0.02	0.08	0.00	0.01	0.02	0.01	0.00	0.04	0.02
	Min	2.90	1.98	0.16	0.40	0.41	0.43	0.80	0.99	0.53	0.47	0.69	0.86	0.59	0.77	0.34
	Max	2.94	2.00	0.17	0.40	0.41	0.44	0.82	1.07	0.53	0.48	0.71	0.87	0.59	0.81	0.36
♀ (*N* = 1)		**2.97**	**2.01**	**0.16**	**0.40**	**0.43**	**0.46**	**0.88**	**1.14**	**0.51**	**0.53**	**0.71**	**0.81**	**0.61**	**0.77**	**0.38**
Maculiphylus																
M. eremophilae																
♂ (*N* = 5)	**Mean**	**3.23**	**2.03**	**0.18**	**0.39**	**0.40**	**0.54**	**0.76**	**0.96**	**0.47**	**0.29**	**0.85**	**1.11**	**0.39**	**0.79**	**0.30**
	SD	0.20	0.16	0.02	0.03	0.04	0.03	0.01	0.06	0.02	0.02	0.02	0.01	0.02	0.04	0.01
	Range	0.51	0.37	0.05	0.06	0.08	0.09	0.04	0.13	0.06	0.04	0.04	0.03	0.05	0.09	0.02
	Min	2.96	1.83	0.17	0.36	0.36	0.49	0.74	0.90	0.44	0.28	0.83	1.09	0.36	0.74	0.29
	Max	3.47	2.20	0.22	0.42	0.44	0.58	0.78	1.03	0.50	0.32	0.87	1.12	0.41	0.83	0.31
♀ (*N* = 5)	**Mean**	**2.85**	**1.88**	**0.18**	**0.40**	**0.36**	**0.47**	**0.72**	**0.97**	**0.46**	**0.36**	**0.69**	**0.97**	**0.50**	**0.74**	**0.34**

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	SD	0.11	0.05	0.01	0.02	0.01	0.03	0.02	0.06	0.02	0.01	0.00	0.03	0.02	0.02	0.02
	Range	0.26	0.13	0.03	0.04	0.04	0.08	0.05	0.13	0.04	0.03	0.01	0.06	0.04	0.05	0.06
	Min	2.77	1.84	0.16	0.38	0.34	0.44	0.70	0.92	0.44	0.35	0.69	0.93	0.48	0.71	0.32
	Max	3.03	1.97	0.19	0.42	0.38	0.52	0.75	1.05	0.48	0.38	0.70	0.99	0.52	0.76	0.38
Monospiniphallus																
M. bignoniiflori																
♂ (*N* = 5)	**Mean**	**3.67**	**2.58**	**0.22**	**0.50**	**0.44**	**0.61**	**0.84**	**1.04**	**0.52**	**0.29**	**1.40**	**1.67**	**0.34**	**0.81**	**0.28**
	SD	0.22	0.12	0.03	0.03	0.01	0.04	0.03	0.05	0.06	0.02	0.09	0.08	0.01	0.04	0.01
	Range	0.55	0.29	0.09	0.09	0.02	0.08	0.05	0.13	0.11	0.04	0.23	0.20	0.04	0.10	0.03
	Min	3.50	2.51	0.18	0.47	0.44	0.58	0.81	0.98	0.47	0.26	1.25	1.54	0.32	0.75	0.27
	Max	4.05	2.80	0.27	0.56	0.46	0.66	0.86	1.11	0.58	0.30	1.48	1.74	0.36	0.85	0.30
♀ (*N* = 5)	**Mean**	**3.84**	**2.67**	**0.28**	**0.51**	**0.45**	**0.62**	**0.85**	**1.07**	**0.54**	**0.39**	**1.42**	**1.68**	**0.46**	**0.79**	**0.28**
	SD	0.13	0.07	0.03	0.04	0.01	0.01	0.02	0.03	0.01	0.01	0.08	0.08	0.01	0.01	0.00
	Range	0.34	0.15	0.06	0.09	0.03	0.04	0.04	0.06	0.02	0.01	0.16	0.18	0.02	0.03	0.01
	Min	3.61	2.58	0.25	0.45	0.44	0.60	0.83	1.04	0.53	0.38	1.35	1.58	0.45	0.78	0.28
	Max	3.95	2.73	0.31	0.54	0.47	0.64	0.87	1.10	0.55	0.39	1.51	1.76	0.47	0.81	0.29
M. namyatovae																
♂ (*N* = 1)		**4.25**	**2.70**	**0.26**	**0.40**	**0.40**	**0.81**	**0.69**	**0.99**	**0.53**	**0.36**	**1.24**	**1.80**	**0.52**	**0.69**	**0.23**
M. norsemanensis																
♂ (*N* = 1)		**3.10**	**2.03**	**0.13**	**0.38**	**0.35**	**0.61**	**0.62**	**0.88**	**0.43**	**0.30**	**0.79**	**1.27**	**0.48**	**0.71**	**0.28**
Myophorophylus																
M. carinatus																
♂ (*N* = 5)	**Mean**	**3.25**	**2.16**	**0.21**	**0.47**	**0.41**	**0.52**	**0.75**	**1.18**	**0.59**	**0.37**	**0.44**	**0.59**	**0.50**	**0.64**	**0.36**
	SD	0.08	0.08	0.02	0.03	0.03	0.02	0.02	0.06	0.03	0.02	0.01	0.02	0.02	0.03	0.02
	Range	0.21	0.18	0.06	0.09	0.06	0.05	0.05	0.15	0.08	0.05	0.04	0.05	0.04	0.09	0.04
	Min	3.17	2.07	0.18	0.41	0.37	0.49	0.72	1.08	0.55	0.35	0.42	0.57	0.48	0.61	0.34
	Max	3.38	2.25	0.24	0.50	0.43	0.54	0.77	1.23	0.63	0.40	0.46	0.62	0.52	0.70	0.38
♀ (*N* = 5)	**Mean**	**3.24**	**2.25**	**0.24**	**0.49**	**0.41**	**0.48**	**0.77**	**1.21**	**0.59**	**0.40**	**0.43**	**0.56**	**0.52**	**0.64**	**0.37**
	SD	0.12	0.12	0.01	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.04	0.04	0.01	0.01	0.01
	Range	0.28	0.30	0.03	0.04	0.05	0.06	0.06	0.13	0.06	0.04	0.10	0.10	0.02	0.03	0.01
	Min	3.09	2.10	0.23	0.47	0.39	0.45	0.73	1.14	0.55	0.38	0.36	0.49	0.51	0.62	0.37
	Max	3.37	2.40	0.26	0.51	0.44	0.51	0.79	1.27	0.61	0.42	0.46	0.59	0.53	0.65	0.38
M. grossi																
♂ (*N* = 5)	**Mean**	**4.19**	**2.79**	**0.24**	**0.56**	**0.56**	**0.72**	**0.91**	**1.39**	**0.71**	**0.36**	**0.98**	**1.08**	**0.39**	**0.65**	**0.33**
	SD	0.14	0.14	0.05	0.03	0.02	0.02	0.02	0.03	0.03	0.01	0.04	0.03	0.01	0.02	0.02

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Range	0.34	0.36	0.15	0.09	0.06	0.04	0.07	0.07	0.07	0.02	0.11	0.07	0.02	0.06	0.04
	Min	3.96	2.56	0.17	0.51	0.52	0.70	0.87	1.35	0.68	0.35	0.92	1.05	0.38	0.62	0.32
	Max	4.30	2.92	0.32	0.60	0.58	0.74	0.94	1.42	0.75	0.37	1.03	1.12	0.40	0.68	0.36
♀ (*N* = 5)	**Mean**	**4.30**	**2.91**	**0.26**	**0.60**	**0.58**	**0.74**	**0.94**	**1.52**	**0.78**	**0.44**	**0.99**	**1.05**	**0.47**	**0.62**	**0.35**
	SD	0.08	0.05	0.02	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.02	0.00
	Range	0.20	0.12	0.04	0.04	0.04	0.03	0.03	0.08	0.06	0.03	0.07	0.05	0.03	0.04	0.01
	Min	4.23	2.86	0.24	0.58	0.56	0.72	0.93	1.48	0.75	0.43	0.96	1.03	0.45	0.60	0.35
	Max	4.43	2.98	0.28	0.62	0.60	0.75	0.96	1.56	0.81	0.46	1.03	1.08	0.48	0.64	0.36
Myrtophylus																
M. calytrix																
♂ (*N* = 9)	**Mean**	**4.26**	**2.84**	**0.30**	**0.46**	**0.40**	**0.79**	**0.73**	**1.00**	**0.52**	**0.28**	**1.40**	**1.90**	**0.38**	**0.72**	**0.24**
	SD	0.20	0.18	0.07	0.03	0.03	0.04	0.03	0.01	0.03	0.03	0.09	0.12	0.06	0.03	0.01
	Range	0.61	0.53	0.22	0.08	0.09	0.12	0.10	0.04	0.08	0.09	0.23	0.30	0.14	0.10	0.03
	Min	3.98	2.63	0.19	0.43	0.34	0.74	0.66	0.99	0.47	0.24	1.29	1.71	0.33	0.66	0.22
	Max	4.59	3.16	0.41	0.51	0.43	0.86	0.76	1.03	0.55	0.33	1.52	2.01	0.47	0.76	0.25
♀ (*N* = 9)	**Mean**	**4.01**	**2.78**	**0.28**	**0.47**	**0.41**	**0.67**	**0.73**	**1.11**	**0.56**	**0.34**	**1.36**	**1.86**	**0.46**	**0.66**	**0.28**
	SD	0.28	0.24	0.06	0.04	0.02	0.06	0.03	0.03	0.02	0.03	0.04	0.08	0.03	0.01	0.01
	Range	0.81	0.68	0.16	0.11	0.06	0.19	0.09	0.09	0.05	0.07	0.14	0.27	0.07	0.04	0.04
	Min	3.68	2.52	0.20	0.41	0.37	0.60	0.69	1.06	0.54	0.31	1.31	1.75	0.43	0.65	0.26
	Max	4.49	3.20	0.36	0.52	0.43	0.79	0.78	1.15	0.59	0.38	1.45	2.02	0.50	0.69	0.30
M. melaleuci																
♂ (*N* = 5)	**Mean**	**3.77**	**2.40**	**0.24**	**0.38**	**0.36**	**0.69**	**0.67**	**0.90**	**0.44**	**0.30**	**1.15**	**1.70**	**0.44**	**0.75**	**0.24**
	SD	0.08	0.05	0.03	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.04	0.05	0.01	0.01	0.01
	Range	0.22	0.13	0.07	0.03	0.01	0.06	0.04	0.06	0.04	0.02	0.09	0.13	0.03	0.02	0.01
	Min	3.65	2.33	0.20	0.36	0.36	0.65	0.65	0.87	0.42	0.29	1.10	1.63	0.42	0.74	0.23
	Max	3.87	2.46	0.27	0.39	0.37	0.71	0.69	0.93	0.46	0.31	1.19	1.76	0.45	0.76	0.24
♀ (*N* = 4)	**Mean**	**3.07**	**2.14**	**0.23**	**0.39**	**0.33**	**0.47**	**0.67**	**0.95**	**0.46**	**0.35**	**1.02**	**1.52**	**0.52**	**0.71**	**0.31**
	SD	0.07	0.05	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.01	0.01
	Range	0.16	0.11	0.06	0.04	0.01	0.03	0.02	0.01	0.02	0.02	0.07	0.06	0.03	0.04	0.02
	Min	2.99	2.10	0.21	0.37	0.33	0.46	0.66	0.94	0.45	0.34	0.98	1.49	0.50	0.69	0.30
	Max	3.15	2.21	0.27	0.41	0.34	0.49	0.68	0.95	0.47	0.36	1.05	1.55	0.53	0.73	0.32
M. micromyrti																
♂ (*N* = 2)	**Mean**	**3.64**	**2.47**	**0.24**	**0.42**	**0.39**	**0.60**	**0.66**	**0.91**	**0.48**	**0.30**	**1.05**	**1.63**	**0.45**	**0.72**	**0.26**
	SD	0.72	0.40	0.01	0.01	0.07	0.12	0.02	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.04
	Range	1.02	0.56	0.01	0.02	0.10	0.17	0.03	0.03	0.03	0.01	0.00	0.00	0.01	0.00	0.07
	Min	3.13	2.19	0.24	0.41	0.34	0.52	0.65	0.90	0.47	0.29	1.05	1.63	0.44	0.72	0.22

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Max	4.15	2.75	0.25	0.43	0.44	0.69	0.68	0.93	0.50	0.30	1.05	1.63	0.45	0.72	0.29
♀ (*N* = 4)	**Mean**	**3.55**	**2.44**	**0.24**	**0.44**	**0.39**	**0.54**	**0.73**	**1.05**	**0.55**	**0.37**	**1.13**	**1.54**	**0.50**	**0.70**	**0.30**
	SD	0.08	0.05	0.03	0.03	0.03	0.01	0.02	0.04	0.01	0.01	0.05	0.03	0.01	0.01	0.01
	Range	0.17	0.11	0.08	0.06	0.07	0.03	0.03	0.09	0.03	0.01	0.11	0.08	0.02	0.03	0.03
	Min	3.47	2.39	0.19	0.42	0.36	0.52	0.71	1.00	0.54	0.36	1.06	1.50	0.49	0.68	0.28
	Max	3.64	2.50	0.27	0.48	0.43	0.55	0.74	1.09	0.57	0.37	1.17	1.58	0.51	0.71	0.31
Omnivoriphylus																
O. boiada																
♂ (*N* = 7)	**Mean**	**4.19**	**2.68**	**0.22**	**0.44**	**0.46**	**0.76**	**0.85**	**1.12**	**0.59**	**0.36**	**1.01**	**1.19**	**0.42**	**0.76**	**0.27**
	SD	0.19	0.15	0.03	0.04	0.03	0.06	0.02	0.04	0.01	0.01	0.05	0.04	0.01	0.03	0.00
	Range	0.57	0.45	0.08	0.10	0.07	0.15	0.04	0.13	0.03	0.03	0.11	0.09	0.04	0.08	0.01
	Min	3.98	2.55	0.17	0.40	0.43	0.68	0.83	1.07	0.58	0.35	0.95	1.14	0.40	0.72	0.26
	Max	4.55	3.00	0.25	0.50	0.50	0.83	0.87	1.20	0.61	0.38	1.06	1.23	0.44	0.80	0.27
♀ (*N* = 5)	**Mean**	**3.83**	**2.62**	**0.29**	**0.50**	**0.42**	**0.63**	**0.89**	**1.16**	**0.60**	**0.46**	**0.97**	**1.09**	**0.52**	**0.76**	**0.30**
	SD	0.16	0.04	0.04	0.01	0.02	0.03	0.02	0.05	0.02	0.01	0.07	0.06	0.01	0.03	0.01
	Range	0.41	0.13	0.10	0.03	0.06	0.07	0.04	0.10	0.05	0.03	0.13	0.13	0.03	0.07	0.03
	Min	3.68	2.56	0.22	0.49	0.40	0.60	0.87	1.12	0.58	0.45	0.92	1.03	0.51	0.73	0.29
	Max	4.09	2.69	0.32	0.52	0.46	0.67	0.91	1.22	0.63	0.48	1.05	1.16	0.54	0.80	0.32
O. charleville																
♂ (*N* = 1)		**4.10**	**2.70**	**0.35**	**0.54**	**0.46**	**0.69**	**0.80**	**1.09**	**0.56**	**0.39**	**1.16**	**1.46**	**0.49**	**0.73**	**0.27**
O. frankenii																
♂ (*N* = 5)	**Mean**	**3.35**	**2.17**	**0.19**	**0.42**	**0.35**	**0.61**	**0.84**	**0.87**	**0.40**	**0.31**	**1.02**	**1.22**	**0.37**	**0.97**	**0.26**
	SD	0.13	0.07	0.03	0.02	0.02	0.04	0.02	0.03	0.02	0.01	0.05	0.03	0.01	0.03	0.00
	Range	0.31	0.19	0.06	0.04	0.04	0.09	0.06	0.07	0.04	0.02	0.11	0.08	0.04	0.07	0.01
	Min	3.21	2.08	0.17	0.41	0.33	0.57	0.81	0.84	0.38	0.30	0.98	1.19	0.36	0.93	0.25
	Max	3.52	2.27	0.23	0.45	0.37	0.66	0.87	0.91	0.42	0.32	1.09	1.27	0.40	1.00	0.26
♀ (*N* = 5)	**Mean**	**3.09**	**2.08**	**0.20**	**0.41**	**0.32**	**0.52**	**0.82**	**0.88**	**0.40**	**0.38**	**0.90**	**1.10**	**0.47**	**0.93**	**0.28**
	SD	0.05	0.06	0.02	0.02	0.01	0.02	0.01	0.03	0.02	0.01	0.04	0.04	0.01	0.02	0.01
	Range	0.13	0.14	0.06	0.04	0.02	0.04	0.03	0.06	0.04	0.03	0.10	0.09	0.02	0.05	0.01
	Min	3.04	2.03	0.17	0.40	0.31	0.50	0.81	0.85	0.39	0.37	0.86	1.05	0.46	0.91	0.28
	Max	3.17	2.17	0.23	0.44	0.33	0.54	0.84	0.91	0.43	0.40	0.96	1.14	0.48	0.96	0.29
O. mangaensis																
♂ (*N* = 6)	**Mean**	**4.46**	**2.80**	**0.25**	**0.43**	**0.46**	**0.86**	**0.77**	**1.06**	**0.57**	**0.27**	**1.08**	**1.40**	**0.35**	**0.73**	**0.24**
	SD	0.19	0.09	0.03	0.02	0.02	0.07	0.01	0.04	0.03	0.01	0.09	0.11	0.01	0.02	0.01
	Range	0.46	0.23	0.07	0.04	0.06	0.17	0.03	0.09	0.07	0.02	0.26	0.29	0.03	0.06	0.03
	Min	4.24	2.69	0.22	0.41	0.43	0.80	0.76	1.01	0.54	0.26	0.95	1.25	0.34	0.70	0.22

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Max	4.70	2.92	0.29	0.45	0.49	0.97	0.79	1.10	0.61	0.28	1.21	1.54	0.37	0.76	0.25
♀ (*N* = 4)	**Mean**	**4.00**	**2.64**	**0.25**	**0.43**	**0.43**	**0.72**	**0.77**	**1.07**	**0.56**	**0.38**	**1.00**	**1.29**	**0.49**	**0.72**	**0.27**
	SD	0.23	0.17	0.04	0.03	0.01	0.05	0.06	0.06	0.03	0.06	0.07	0.05	0.03	0.04	0.01
	Range	0.52	0.40	0.08	0.08	0.04	0.11	0.14	0.11	0.06	0.12	0.17	0.10	0.08	0.09	0.01
	Min	3.68	2.44	0.22	0.39	0.41	0.67	0.72	1.01	0.53	0.34	0.91	1.26	0.46	0.68	0.26
	Max	4.20	2.84	0.30	0.47	0.45	0.78	0.86	1.12	0.59	0.46	1.08	1.36	0.54	0.77	0.27
O. wanarra																
♂ (*N* = 1)		**4.70**	**3.08**	**0.31**	**0.54**	**0.50**	**1.00**	**0.76**	**1.15**	**0.62**	**0.39**	**1.21**	**1.59**	**0.51**	**0.66**	**0.24**
Proteophylus																
P. acaciae																
♂ (*N* = 5)	**Mean**	**2.33**	**1.64**	**0.18**	**0.30**	**0.28**	**0.36**	**0.52**	**0.76**	**0.37**	**0.26**	**0.55**	**1.05**	**0.50**	**0.69**	**0.33**
	SD	0.03	0.06	0.01	0.02	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01
	Range	0.09	0.14	0.02	0.05	0.03	0.07	0.02	0.06	0.03	0.02	0.02	0.06	0.03	0.03	0.03
	Min	2.30	1.54	0.17	0.27	0.27	0.33	0.51	0.74	0.35	0.25	0.54	1.03	0.49	0.67	0.32
	Max	2.39	1.68	0.19	0.32	0.30	0.40	0.53	0.80	0.38	0.27	0.56	1.09	0.52	0.70	0.35
♀ (*N* = 5)	**Mean**	**2.36**	**1.67**	**0.20**	**0.31**	**0.28**	**0.34**	**0.52**	**0.76**	**0.38**	**0.27**	**0.55**	**1.05**	**0.52**	**0.68**	**0.32**
	SD	0.14	0.09	0.03	0.03	0.01	0.03	0.02	0.05	0.02	0.01	0.03	0.04	0.01	0.02	0.01
	Range	0.35	0.25	0.06	0.06	0.03	0.08	0.05	0.12	0.05	0.03	0.07	0.09	0.03	0.04	0.03
	Min	2.17	1.54	0.16	0.29	0.26	0.30	0.51	0.73	0.36	0.26	0.52	1.02	0.51	0.66	0.31
	Max	2.52	1.79	0.22	0.35	0.29	0.38	0.56	0.85	0.41	0.29	0.59	1.11	0.54	0.70	0.34
P. grevilleae																
♂ (*N* = 6)	**Mean**	**3.04**	**2.15**	**0.22**	**0.44**	**0.40**	**0.39**	**0.68**	**0.96**	**0.49**	**0.29**	**0.73**	**1.07**	**0.42**	**0.71**	**0.31**
	SD	0.23	0.18	0.04	0.06	0.03	0.04	0.06	0.08	0.05	0.01	0.09	0.06	0.04	0.03	0.01
	Range	0.57	0.47	0.07	0.15	0.08	0.13	0.18	0.21	0.12	0.03	0.17	0.15	0.10	0.08	0.03
	Min	2.61	1.84	0.19	0.34	0.35	0.32	0.58	0.84	0.40	0.27	0.63	0.99	0.38	0.68	0.30
	Max	3.18	2.31	0.26	0.49	0.43	0.45	0.76	1.05	0.52	0.30	0.80	1.14	0.48	0.76	0.33
♀ (*N* = 6)	**Mean**	**2.99**	**2.12**	**0.23**	**0.45**	**0.38**	**0.39**	**0.65**	**1.00**	**0.50**	**0.33**	**0.73**	**1.11**	**0.51**	**0.65**	**0.34**
	SD	0.30	0.25	0.06	0.05	0.03	0.04	0.06	0.08	0.05	0.02	0.11	0.12	0.02	0.02	0.01
	Range	0.82	0.73	0.13	0.13	0.09	0.12	0.18	0.22	0.15	0.06	0.26	0.26	0.06	0.06	0.02
	Min	2.46	1.66	0.17	0.37	0.31	0.33	0.56	0.85	0.41	0.29	0.55	0.99	0.47	0.62	0.33
	Max	3.28	2.39	0.30	0.50	0.40	0.45	0.74	1.07	0.56	0.35	0.81	1.25	0.53	0.68	0.35
P. occidentalis																
♂ (*N* = 6)	**Mean**	**2.49**	**1.78**	**0.22**	**0.38**	**0.35**	**0.34**	**0.64**	**0.91**	**0.46**	**0.33**	**0.52**	**0.81**	**0.52**	**0.70**	**0.37**
	SD	0.14	0.08	0.04	0.03	0.02	0.02	0.03	0.05	0.02	0.02	0.05	0.05	0.01	0.02	0.02
	Range	0.37	0.19	0.11	0.10	0.04	0.05	0.07	0.14	0.06	0.05	0.15	0.16	0.03	0.06	0.04
	Min	2.40	1.71	0.14	0.33	0.32	0.33	0.61	0.83	0.42	0.31	0.44	0.71	0.51	0.68	0.35

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Max	2.77	1.90	0.25	0.43	0.36	0.38	0.68	0.97	0.48	0.36	0.59	0.87	0.54	0.74	0.39
♀ (*N* = 5)	**Mean**	**3.06**	**2.19**	**0.29**	**0.44**	**0.39**	**0.40**	**0.71**	**1.06**	**0.51**	**0.38**	**0.58**	**0.82**	**0.54**	**0.67**	**0.35**
	SD	0.06	0.02	0.01	0.03	0.01	0.02	0.03	0.04	0.03	0.02	0.03	0.02	0.01	0.01	0.01
	Range	0.17	0.06	0.03	0.07	0.03	0.05	0.07	0.09	0.06	0.05	0.08	0.05	0.02	0.03	0.04
	Min	2.99	2.17	0.28	0.40	0.38	0.38	0.67	1.00	0.47	0.36	0.53	0.80	0.53	0.65	0.33
	Max	3.16	2.23	0.31	0.47	0.41	0.43	0.74	1.09	0.53	0.41	0.61	0.85	0.55	0.68	0.37
P. orientalis																
♂ (*N* = 6)	**Mean**	**2.94**	**2.01**	**0.19**	**0.48**	**0.37**	**0.43**	**0.70**	**1.05**	**0.48**	**0.32**	**0.60**	**0.85**	**0.46**	**0.67**	**0.36**
	SD	0.11	0.10	0.03	0.03	0.02	0.01	0.01	0.05	0.04	0.01	0.03	0.04	0.02	0.03	0.01
	Range	0.29	0.26	0.11	0.07	0.04	0.03	0.04	0.12	0.07	0.03	0.07	0.11	0.05	0.09	0.02
	Min	2.80	1.88	0.13	0.44	0.35	0.41	0.69	1.01	0.45	0.31	0.57	0.81	0.44	0.61	0.35
	Max	3.09	2.14	0.24	0.51	0.39	0.44	0.73	1.13	0.52	0.34	0.64	0.92	0.49	0.70	0.37
♀ (*N* = 5)	**Mean**	**3.33**	**2.31**	**0.26**	**0.56**	**0.43**	**0.50**	**0.77**	**1.24**	**0.58**	**0.39**	**0.62**	**0.81**	**0.51**	**0.62**	**0.37**
	SD	0.12	0.08	0.05	0.02	0.02	0.03	0.01	0.02	0.03	0.01	0.02	0.01	0.01	0.01	0.01
	Range	0.30	0.20	0.11	0.04	0.06	0.06	0.03	0.04	0.07	0.02	0.04	0.03	0.01	0.02	0.02
	Min	3.19	2.19	0.19	0.53	0.39	0.46	0.75	1.22	0.53	0.38	0.60	0.80	0.50	0.61	0.36
	Max	3.49	2.39	0.30	0.57	0.45	0.52	0.78	1.26	0.60	0.40	0.64	0.83	0.51	0.63	0.38
P. petrophile																
♂ (*N* = 6)	**Mean**	**2.85**	**2.06**	**0.23**	**0.41**	**0.33**	**0.43**	**0.70**	**0.97**	**0.47**	**0.32**	**0.65**	**0.92**	**0.46**	**0.72**	**0.34**
	SD	0.12	0.09	0.02	0.03	0.02	0.04	0.03	0.05	0.03	0.01	0.02	0.01	0.01	0.02	0.01
	Range	0.34	0.20	0.07	0.09	0.04	0.09	0.06	0.11	0.08	0.03	0.06	0.03	0.03	0.05	0.02
	Min	2.70	1.95	0.20	0.39	0.32	0.39	0.67	0.92	0.43	0.31	0.62	0.91	0.45	0.68	0.33
	Max	3.04	2.15	0.27	0.48	0.36	0.48	0.73	1.03	0.51	0.34	0.68	0.94	0.48	0.73	0.35
♀ (*N* = 6)	**Mean**	**3.12**	**2.27**	**0.26**	**0.47**	**0.37**	**0.43**	**0.73**	**1.06**	**0.53**	**0.35**	**0.71**	**0.97**	**0.48**	**0.69**	**0.34**
	SD	0.14	0.11	0.02	0.02	0.03	0.01	0.02	0.06	0.04	0.01	0.04	0.04	0.01	0.03	0.01
	Range	0.37	0.29	0.06	0.05	0.08	0.03	0.06	0.13	0.09	0.04	0.10	0.10	0.03	0.08	0.04
	Min	2.88	2.14	0.23	0.44	0.34	0.42	0.70	1.00	0.48	0.33	0.67	0.94	0.46	0.65	0.31
	Max	3.25	2.43	0.29	0.49	0.42	0.45	0.76	1.13	0.57	0.37	0.77	1.04	0.49	0.73	0.35
Pulvillophylus																
P. angustus																
♂ (*N* = 1)		**3.85**	**2.73**	**0.51**	**0.46**	**0.41**	**0.57**	**0.68**	**1.02**	**0.49**	**0.39**	**1.25**	**1.84**	**0.57**	**0.66**	**0.27**
P. croninensis																
♂ (*N* = 1)		**6.05**	**4.35**	**0.91**	**0.63**	**0.56**	**0.81**	**0.80**	**1.26**	**0.69**	**0.38**	**1.65**	**2.06**	**0.47**	**0.64**	**0.21**
♀ (*N* = 1)		**6.43**	**4.65**	**1.09**	**0.71**	**0.59**	**0.85**	**0.85**	**1.31**	**0.75**	**0.43**	**1.99**	**2.34**	**0.50**	**0.65**	**0.20**
P. cuneotinctus																
♂ (*N* = 5)	**Mean**	**6.08**	**4.19**	**0.63**	**0.70**	**0.63**	**0.99**	**1.07**	**1.52**	**0.76**	**0.40**	**1.88**	**1.76**	**0.37**	**0.71**	**0.25**

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	SD	0.20	0.15	0.06	0.05	0.03	0.04	0.03	0.10	0.06	0.01	0.13	0.09	0.01	0.02	0.01
	Range	0.53	0.34	0.16	0.10	0.08	0.08	0.08	0.25	0.14	0.02	0.29	0.20	0.03	0.06	0.02
	Min	5.82	4.07	0.55	0.65	0.60	0.93	1.03	1.42	0.70	0.38	1.74	1.65	0.36	0.66	0.24
	Max	6.35	4.41	0.71	0.75	0.68	1.01	1.11	1.67	0.84	0.40	2.03	1.85	0.39	0.72	0.26
P. rossi																
♂ (*N* = 5)	**Mean**	**3.46**	**2.39**	**0.30**	**0.47**	**0.41**	**0.48**	**0.85**	**1.02**	**0.49**	**0.47**	**0.98**	**1.15**	**0.56**	**0.83**	**0.29**
	SD	0.15	0.08	0.01	0.02	0.01	0.03	0.02	0.03	0.01	0.03	0.04	0.02	0.02	0.01	0.01
	Range	0.34	0.16	0.03	0.06	0.04	0.08	0.05	0.09	0.02	0.07	0.10	0.06	0.05	0.03	0.01
	Min	3.29	2.33	0.29	0.44	0.39	0.45	0.82	0.97	0.48	0.43	0.94	1.13	0.52	0.82	0.29
	Max	3.63	2.49	0.32	0.50	0.43	0.53	0.87	1.06	0.50	0.50	1.04	1.19	0.57	0.85	0.30
♀ (*N* = 5)	**Mean**	**3.84**	**2.70**	**0.44**	**0.52**	**0.43**	**0.51**	**0.91**	**1.09**	**0.52**	**0.51**	**1.01**	**1.10**	**0.56**	**0.84**	**0.28**
	SD	0.07	0.05	0.05	0.04	0.02	0.03	0.02	0.06	0.03	0.02	0.04	0.05	0.02	0.03	0.02
	Range	0.20	0.11	0.10	0.10	0.04	0.07	0.06	0.16	0.06	0.05	0.11	0.14	0.03	0.08	0.04
	Min	3.74	2.66	0.39	0.46	0.42	0.46	0.88	1.01	0.50	0.48	0.97	1.03	0.55	0.79	0.26
	Max	3.94	2.77	0.49	0.56	0.46	0.53	0.94	1.17	0.56	0.53	1.08	1.17	0.58	0.87	0.30
P. rubritinctus																
♂ (*N* = 1)		**5.40**	**4.05**	**0.64**	**0.78**	**0.64**	**0.71**	**0.86**	**1.48**	**0.75**	**0.40**	**1.73**	**2.00**	**0.46**	**0.58**	**0.27**
Spinivesica																
S. crenulata																
♂ (*N* = 5)	**Mean**	**2.68**	**1.78**	**0.17**	**0.33**	**0.33**	**0.44**	**0.66**	**0.87**	**0.42**	**0.34**	**0.50**	**0.76**	**0.52**	**0.76**	**0.32**
	SD	0.11	0.08	0.02	0.02	0.02	0.01	0.02	0.04	0.03	0.01	0.04	0.06	0.01	0.01	0.01
	Range	0.28	0.22	0.05	0.04	0.05	0.03	0.06	0.11	0.07	0.02	0.10	0.14	0.03	0.03	0.03
	Min	2.54	1.64	0.15	0.31	0.30	0.43	0.63	0.82	0.38	0.33	0.45	0.71	0.50	0.74	0.31
	Max	2.82	1.86	0.20	0.35	0.35	0.46	0.69	0.93	0.45	0.35	0.55	0.85	0.53	0.77	0.34
♀ (*N* = 5)	**Mean**	**2.45**	**1.66**	**0.16**	**0.32**	**0.29**	**0.41**	**0.65**	**0.84**	**0.41**	**0.36**	**0.46**	**0.71**	**0.55**	**0.77**	**0.35**
	SD	0.12	0.09	0.04	0.02	0.03	0.01	0.02	0.03	0.03	0.01	0.03	0.03	0.01	0.01	0.01
	Range	0.28	0.18	0.10	0.05	0.08	0.03	0.06	0.07	0.09	0.02	0.07	0.07	0.03	0.03	0.03
	Min	2.32	1.56	0.11	0.29	0.24	0.40	0.62	0.82	0.37	0.35	0.44	0.68	0.53	0.75	0.33
	Max	2.60	1.74	0.21	0.34	0.32	0.43	0.68	0.89	0.46	0.37	0.51	0.75	0.56	0.78	0.36
S. crypticus																
♂ (*N* = 3)	**Mean**	**3.14**	**2.05**	**0.18**	**0.36**	**0.38**	**0.54**	**0.69**	**0.97**	**0.52**	**0.34**	**0.62**	**0.89**	**0.49**	**0.72**	**0.31**
	SD	0.41	0.26	0.02	0.03	0.06	0.09	0.07	0.13	0.09	0.02	0.13	0.10	0.03	0.03	0.01
	Range	0.77	0.48	0.04	0.06	0.12	0.18	0.13	0.23	0.17	0.03	0.23	0.18	0.05	0.06	0.01
	Min	2.68	1.75	0.16	0.33	0.32	0.45	0.61	0.82	0.43	0.32	0.48	0.78	0.47	0.69	0.30
	Max	3.45	2.23	0.20	0.39	0.44	0.63	0.74	1.05	0.60	0.35	0.71	0.96	0.52	0.75	0.31

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
♀ (*N* = 4)	**Mean**	**2.90**	**1.99**	**0.23**	**0.38**	**0.37**	**0.46**	**0.68**	**0.95**	**0.48**	**0.34**	**0.75**	**1.10**	**0.50**	**0.72**	**0.33**
	SD	0.09	0.10	0.05	0.03	0.01	0.04	0.04	0.03	0.02	0.03	0.01	0.07	0.01	0.03	0.01
	Range	0.21	0.22	0.10	0.07	0.03	0.09	0.09	0.06	0.05	0.06	0.02	0.17	0.03	0.06	0.01
	Min	2.80	1.91	0.18	0.34	0.36	0.42	0.63	0.93	0.45	0.31	0.74	1.03	0.48	0.68	0.32
	Max	3.01	2.13	0.28	0.41	0.39	0.51	0.72	0.99	0.50	0.37	0.76	1.20	0.51	0.74	0.33
S. decipiens																
♂ (*N* = 3)	**Mean**	**3.77**	**2.50**	**0.25**	**0.44**	**0.41**	**0.75**	**0.82**	**1.04**	**0.54**	**0.43**	**1.00**	**1.23**	**0.52**	**0.78**	**0.28**
	SD	0.23	0.00	0.00	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.06	0.07	0.02	0.01	0.02
	Range	0.41	0.01	0.01	0.02	0.03	0.06	0.03	0.03	0.03	0.02	0.12	0.13	0.04	0.01	0.02
	Min	3.50	2.49	0.24	0.43	0.40	0.73	0.80	1.03	0.53	0.42	0.96	1.18	0.51	0.78	0.27
	Max	3.91	2.50	0.25	0.45	0.43	0.79	0.83	1.06	0.56	0.44	1.08	1.31	0.55	0.79	0.29
S. eremophilicola																
♂ (*N* = 5)	**Mean**	**2.42**	**1.64**	**0.14**	**0.30**	**0.30**	**0.40**	**0.56**	**0.81**	**0.40**	**0.31**	**0.50**	**0.89**	**0.55**	**0.70**	**0.33**
	SD	0.16	0.10	0.03	0.03	0.01	0.03	0.02	0.03	0.02	0.02	0.04	0.05	0.02	0.02	0.02
	Range	0.43	0.26	0.08	0.07	0.03	0.07	0.04	0.08	0.05	0.05	0.10	0.11	0.04	0.05	0.03
	Min	2.23	1.53	0.11	0.28	0.28	0.38	0.55	0.78	0.38	0.29	0.46	0.83	0.53	0.67	0.32
	Max	2.66	1.79	0.19	0.35	0.31	0.45	0.59	0.86	0.43	0.34	0.56	0.94	0.57	0.72	0.35
♀ (*N* = 5)	**Mean**	**2.55**	**1.75**	**0.17**	**0.31**	**0.31**	**0.39**	**0.60**	**0.85**	**0.42**	**0.34**	**0.53**	**0.88**	**0.56**	**0.71**	**0.33**
	SD	0.08	0.07	0.05	0.02	0.02	0.01	0.02	0.03	0.02	0.01	0.02	0.03	0.01	0.02	0.01
	Range	0.21	0.20	0.13	0.04	0.04	0.01	0.05	0.09	0.05	0.01	0.05	0.08	0.03	0.06	0.02
	Min	2.43	1.65	0.11	0.29	0.29	0.39	0.58	0.80	0.40	0.33	0.49	0.84	0.55	0.67	0.32
	Max	2.64	1.85	0.24	0.33	0.33	0.40	0.63	0.89	0.45	0.34	0.54	0.92	0.58	0.73	0.34
S. eremophiloides																
♂ (*N* = 13)	**Mean**	**2.84**	**1.90**	**0.21**	**0.35**	**0.34**	**0.47**	**0.63**	**0.88**	**0.45**	**0.33**	**0.56**	**0.89**	**0.52**	**0.71**	**0.31**
	SD	0.10	0.07	0.02	0.01	0.02	0.03	0.02	0.03	0.02	0.01	0.02	0.05	0.02	0.02	0.01
	Range	0.35	0.23	0.04	0.06	0.06	0.11	0.05	0.09	0.07	0.04	0.07	0.17	0.06	0.09	0.03
	Min	2.67	1.77	0.19	0.33	0.31	0.42	0.60	0.85	0.42	0.31	0.53	0.81	0.49	0.68	0.30
	Max	3.02	2.00	0.23	0.39	0.37	0.53	0.65	0.94	0.49	0.35	0.60	0.98	0.55	0.77	0.33
♀ (*N* = 13)	**Mean**	**2.87**	**1.92**	**0.22**	**0.36**	**0.34**	**0.46**	**0.65**	**0.92**	**0.47**	**0.36**	**0.58**	**0.89**	**0.55**	**0.71**	**0.32**
	SD	0.13	0.09	0.03	0.02	0.02	0.03	0.02	0.03	0.02	0.01	0.03	0.03	0.02	0.02	0.01
	Range	0.48	0.28	0.12	0.08	0.04	0.09	0.06	0.10	0.06	0.03	0.08	0.13	0.05	0.06	0.05
	Min	2.56	1.76	0.14	0.32	0.32	0.42	0.62	0.88	0.44	0.34	0.53	0.83	0.52	0.67	0.30
	Max	3.04	2.04	0.26	0.40	0.36	0.51	0.68	0.98	0.50	0.37	0.61	0.96	0.57	0.73	0.35
S. mardathuna																
♂ (*N* = 2)	**Mean**	**3.17**	**2.11**	**0.23**	**0.37**	**0.39**	**0.52**	**0.75**	**1.01**	**0.50**	**0.32**	**0.58**	**0.78**	**0.43**	**0.74**	**0.32**

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	SD	0.04	0.06	0.01	0.00	0.03	0.02	0.05	0.01	0.00	0.02	0.00	0.05	0.01	0.06	0.00
	Range	0.06	0.07	0.01	0.01	0.04	0.04	0.08	0.01	0.01	0.03	0.01	0.08	0.01	0.08	0.00
	Min	3.14	2.08	0.23	0.37	0.37	0.50	0.71	1.01	0.50	0.31	0.58	0.74	0.43	0.70	0.32
	Max	3.20	2.15	0.24	0.38	0.41	0.54	0.79	1.02	0.51	0.34	0.59	0.82	0.44	0.78	0.32
♀ (*N* = 3)	**Mean**	**3.05**	**2.12**	**0.22**	**0.37**	**0.38**	**0.49**	**0.77**	**1.02**	**0.53**	**0.36**	**0.58**	**0.75**	**0.47**	**0.76**	**0.33**
	SD	0.10	0.08	0.02	0.01	0.05	0.03	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01
	Range	0.18	0.14	0.05	0.02	0.08	0.07	0.04	0.02	0.04	0.02	0.03	0.01	0.03	0.04	0.03
	Min	2.99	2.07	0.20	0.36	0.33	0.46	0.75	1.01	0.50	0.35	0.56	0.74	0.45	0.74	0.32
	Max	3.17	2.21	0.25	0.38	0.41	0.53	0.79	1.03	0.54	0.37	0.59	0.75	0.48	0.78	0.35
S. pardalota																
♂ (*N* = 2)	**Mean**	**3.64**	**2.27**	**0.20**	**0.43**	**0.41**	**0.70**	**0.70**	**1.05**	**0.56**	**0.35**	**0.73**	**1.05**	**0.50**	**0.67**	**0.29**
	SD	0.05	0.04	0.04	0.04	0.00	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.02	0.00
	Range	0.08	0.06	0.06	0.05	0.00	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.00
	Min	3.60	2.24	0.17	0.40	0.41	0.69	0.69	1.05	0.56	0.35	0.73	1.05	0.50	0.65	0.29
	Max	3.68	2.30	0.23	0.45	0.41	0.71	0.71	1.06	0.57	0.36	0.73	1.05	0.51	0.68	0.29
S. spiculata																
♂ (*N* = 4)	**Mean**	**3.20**	**2.15**	**0.22**	**0.37**	**0.38**	**0.55**	**0.66**	**0.98**	**0.51**	**0.33**	**0.64**	**0.98**	**0.51**	**0.67**	**0.31**
	SD	0.08	0.04	0.02	0.02	0.01	0.03	0.00	0.04	0.02	0.01	0.01	0.02	0.02	0.03	0.01
	Range	0.16	0.09	0.04	0.05	0.02	0.07	0.01	0.08	0.04	0.02	0.03	0.05	0.04	0.06	0.03
	Min	3.16	2.10	0.20	0.35	0.37	0.52	0.65	0.93	0.48	0.33	0.63	0.96	0.50	0.65	0.29
	Max	3.32	2.19	0.24	0.40	0.39	0.59	0.66	1.01	0.52	0.35	0.66	1.01	0.54	0.71	0.32
♀ (*N* = 4)	**Mean**	**3.06**	**2.11**	**0.22**	**0.35**	**0.35**	**0.50**	**0.66**	**0.96**	**0.50**	**0.37**	**0.61**	**0.92**	**0.55**	**0.69**	**0.31**
	SD	0.05	0.06	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.00	0.02	0.01	0.01	0.01	0.01
	Range	0.12	0.12	0.02	0.03	0.04	0.03	0.03	0.04	0.02	0.01	0.03	0.02	0.03	0.02	0.01
	Min	2.98	2.05	0.21	0.34	0.33	0.48	0.65	0.95	0.49	0.36	0.60	0.91	0.54	0.68	0.31
	Max	3.10	2.17	0.23	0.37	0.37	0.51	0.68	0.99	0.51	0.37	0.63	0.93	0.57	0.70	0.32
S. tompricensis																
♂ (*N* = 5)	**Mean**	**3.39**	**2.16**	**0.19**	**0.34**	**0.39**	**0.61**	**0.69**	**1.01**	**0.53**	**0.33**	**0.68**	**0.99**	**0.48**	**0.68**	**0.30**
	SD	0.06	0.07	0.03	0.02	0.01	0.04	0.01	0.02	0.02	0.01	0.03	0.04	0.01	0.02	0.01
	Range	0.16	0.17	0.06	0.04	0.03	0.09	0.03	0.05	0.05	0.03	0.07	0.09	0.03	0.05	0.02
	Min	3.30	2.07	0.16	0.32	0.38	0.57	0.67	0.99	0.50	0.32	0.65	0.95	0.47	0.66	0.29
	Max	3.46	2.24	0.22	0.36	0.41	0.66	0.70	1.04	0.55	0.35	0.72	1.04	0.50	0.71	0.31
♀ (*N* = 5)	**Mean**	**3.21**	**2.10**	**0.19**	**0.36**	**0.38**	**0.53**	**0.69**	**1.01**	**0.53**	**0.36**	**0.68**	**0.98**	**0.52**	**0.68**	**0.32**
	SD	0.12	0.07	0.02	0.02	0.03	0.04	0.02	0.04	0.02	0.01	0.02	0.02	0.02	0.02	0.01
	Range	0.25	0.17	0.07	0.05	0.08	0.09	0.04	0.08	0.05	0.03	0.06	0.05	0.04	0.04	0.03

TABLE 1
(Continued)

Species		Length						Width					Ratio			
		Body	Cun-Clyp	Head	Prono	Scut	Cun	Head	Prono	Scut	IntOcDi	AntSeg2	AS2/HW	IOD/HW	HW/PW	PW/BL
	Min	3.10	2.02	0.16	0.33	0.34	0.49	0.68	0.97	0.50	0.34	0.65	0.96	0.50	0.66	0.31
	Max	3.35	2.19	0.23	0.38	0.42	0.58	0.72	1.05	0.55	0.37	0.71	1.01	0.54	0.70	0.34
S. witchelina																
♂ (*N* = 1)		**3.36**	**2.25**	**0.25**	**0.40**	**0.38**	**0.58**	**0.70**	**1.00**	**0.54**	**0.35**	**0.58**	**0.83**	**0.50**	**0.70**	**0.30**
Telophylus																
T. eremophilae																
♂ (*N* = 8)	**Mean**	**2.56**	**1.83**	**0.20**	**0.34**	**0.27**	**0.42**	**0.52**	**0.78**	**0.36**	**0.28**	**0.77**	**1.47**	**0.53**	**0.67**	**0.30**
	SD	0.14	0.09	0.03	0.01	0.01	0.03	0.01	0.03	0.02	0.01	0.03	0.05	0.01	0.02	0.01
	Range	0.33	0.24	0.09	0.04	0.02	0.08	0.03	0.08	0.05	0.03	0.08	0.12	0.03	0.06	0.04
	Min	2.42	1.75	0.15	0.32	0.26	0.39	0.51	0.73	0.34	0.26	0.73	1.42	0.51	0.65	0.28
	Max	2.75	1.99	0.24	0.36	0.28	0.47	0.54	0.81	0.39	0.29	0.81	1.54	0.54	0.71	0.32
♀ (*N* = 6)	**Mean**	**2.66**	**1.91**	**0.21**	**0.36**	**0.28**	**0.41**	**0.53**	**0.80**	**0.37**	**0.29**	**0.78**	**1.49**	**0.55**	**0.66**	**0.30**
	SD	0.08	0.07	0.03	0.01	0.01	0.02	0.01	0.03	0.02	0.01	0.04	0.09	0.02	0.03	0.01
	Range	0.26	0.20	0.08	0.03	0.02	0.03	0.02	0.05	0.05	0.03	0.10	0.22	0.05	0.06	0.02
	Min	2.54	1.82	0.17	0.34	0.27	0.40	0.52	0.78	0.35	0.28	0.73	1.39	0.53	0.62	0.29
	Max	2.80	2.02	0.25	0.37	0.29	0.43	0.54	0.83	0.40	0.31	0.83	1.61	0.58	0.68	0.31
T. nanutarra																
♂ (*N* = 6)	**Mean**	**2.38**	**1.54**	**0.14**	**0.29**	**0.24**	**0.40**	**0.56**	**0.79**	**0.36**	**0.27**	**0.44**	**0.80**	**0.49**	**0.71**	**0.33**
	SD	0.08	0.05	0.02	0.01	0.02	0.01	0.03	0.03	0.02	0.02	0.01	0.05	0.01	0.03	0.02
	Range	0.23	0.12	0.06	0.03	0.06	0.04	0.05	0.08	0.07	0.04	0.03	0.11	0.04	0.08	0.06
	Min	2.30	1.49	0.12	0.28	0.21	0.38	0.53	0.73	0.32	0.25	0.43	0.74	0.47	0.66	0.29
	Max	2.53	1.61	0.18	0.31	0.27	0.42	0.58	0.81	0.39	0.29	0.46	0.85	0.51	0.74	0.35
♀ (*N* = 3)	**Mean**	**2.27**	**1.53**	**0.13**	**0.28**	**0.26**	**0.37**	**0.57**	**0.80**	**0.37**	**0.30**	**0.45**	**0.78**	**0.52**	**0.71**	**0.36**
	SD	0.14	0.06	0.02	0.03	0.01	0.03	0.01	0.01	0.03	0.01	0.02	0.05	0.01	0.01	0.02
	Range	0.27	0.12	0.04	0.05	0.02	0.05	0.02	0.01	0.06	0.02	0.04	0.10	0.02	0.03	0.04
	Min	2.13	1.46	0.12	0.25	0.25	0.34	0.56	0.80	0.34	0.29	0.42	0.73	0.51	0.70	0.34
	Max	2.40	1.58	0.16	0.30	0.27	0.39	0.58	0.81	0.40	0.31	0.46	0.83	0.53	0.73	0.38

directed medial projection; vestibular sclerites, formed by bases of first gonapophyses and ventromedial extension of ventral labiate plate, usually a compact subsymmetrical structure, rarely large and asymmetrical; dorsal labiate plate with variable size and shape of sclerotized rings; posterior wall simple, usually composed of two lateral sclerites and one medial sclerite, rarely lateral sclerites joined dorsomedially; intersegmental membrane between sternites 8 and 9 sometimes with discrete structure.

Discussion: Schuh and Menard (2013) and Menard et al. (2014) rendered the tribal and subtribal names of this group as Cremnorrhini/Cremnorrhina, an obvious lapsus. We here employ the orthographically correct renderings as used by Reuter (1883), Wagner (1974), and others.

Definitive recognition of cremnorrhinine taxa in Australia is often possible only through inspection of the pretarsus, because the habitus can be remarkably similar to that found in other tribal-level groupings. Nonetheless, as we demonstrate through the use of scanning electron microscopy, the structure of the pretarsus is essentially monotonous across the entire group and unique within the fauna (figs. 8F, 31E, F, 45F, 57D), and therefore an unequivocal character. A very limited number of Australian phylines, all of them currently undescribed, have enlarged pulvilli that are adnate to the entire ventral surface of the claw, but in those cases the claws are shorter than in the Cremnorrhinina. Although the analyses of Menard et al. (2014) and Schuh and Menard (2013) placed some taxa from the Holarctic with this type of claw structure in the Cremnorrhinina (e.g., *Pronotocrepis* Knight, *Dacota* Uhler), many other taxa with such enlarged pulvilli, including the few from Australia, do not appear closely related to the Cremnorrhinina, and in the latter case the structure of the male genitalia also supports their exclusion. Many such examples from the Northern Hemisphere belong to the Nasocorini (e.g., *Atractotomus* Fieber, *Rhinacloa* Reuter, among many others), with a few, such as *Eminoculus* Schuh (Hallodapini) from South Africa, belong to other tribal-level groupings.

We offer additional commentary on relationships and comparisons with cremnorrhinine taxa from other zoogeographical areas in the General Discussion section at the end of this paper.

The following key to genera will serve as an additional aid to recognition of the genera we propose in this paper and assist in the organization of material for the identification of species. The key will be most effective when used to identify male specimens, because many of the characters used in the formation of our generic concepts, as well as for species recognition, are derived from the male genitalia. Positive identification of many genera will require dissection of the male genitalia as is the case for most species. For a large number of genera, identification of females will be possible only through association with males.

KEY TO GENERA OF AUSTRALIAN CREMNORRHININA

1. Dorsum with contrasting dark spots at bases of setae (pls. 1, 2, 16, 18) 2
– Dorsum frequently with some dark markings, e.g., at base of cuneus or on membrane, but never at bases of setae (e.g., pls. 6, 12, 24) . . 6
2. Vestiture a mixture of dark, reclining common setae and flattened, weakly lepidote setae (pl. 18) . . . . . *Lepidophylus*
– Vestiture with only simple setae 3
3. Body form relatively broad; spots on dorsum forming blotches with ill-defined margins (pl. 16); endosoma with two, somewhat twisted, apical spines of subequal length; secondary gonopore with large denticles on outer surface (figs. 46, 47, pl. 17) . . . . . *Halophylus* (in part)
– Body form moderately to strongly elongate; spots on dorsum small, with well-defined margins; endosomal structures not as above 4
4. Endosoma elongate, slender, and J-shaped, without easily distinguished straps and no apical spines; secondary gonopore relatively small, compact, subapical in placement (pl. 18) . . . . . *Maculiphylus*
– Endosoma sigmoid or J-shaped, with two distinct straps and one or two apical spines; secondary gonopore more elongate or unsclerotized and not visible. 5
5. Straps of endosoma confluent and fused proximal to secondary gonopore, and forming a single distal strap and an elongate, erect, apical spine (fig. 2, pl. 1); right paramere very large,

left paramere boxlike, apical portion of posterior process forming a right angle (fig. 2) . . . . . *Adunatiphylus*

– Straps of endosoma distinct over entire length, forming two apical spines; secondary gonopore either normally developed and sclerotized or unsclerotized (figs. 4, 5, pl. 2) . . *Asterophylus*

6. Head weakly to very strongly porrect, often extending beyond anterior margin of eye by distance equal to or greater than length of eye (pl. 26); endosoma with a single hooked apical spine (figs. 76–80, pl. 27) . . . . . *Pulvillophylus*

– Head not conspicuously porrect, although frons sometimes swollen and clypeus visible from above; apical endosomal spines never hooklike 7

7. Eyes often strongly bulging (pls. 6, 20, 24, 30) 8

– Eyes not so strongly bulging 11

8. Small, body form elongate, tubular; head and vertex narrow, eyes bulging; frons often tumid; antennal segments 1 and/or 2 either entirely dark or with some dark areas and not swollen; corium with a dark spot apically (or entirely dark) (pls. 6, 30); endosoma with variable lateral spine near secondary gonopore, usually with microtrichiate surface (pls. 21, 25), and phallotheca sometimes with fields of denticles (figs. 20–22, 24) 9

– Size variable; body not so distinctly tubular; head and vertex wider; frons usually not tumid; antennal segments 1 and/or 2 pale and sometimes conspicuously swollen; corium without dark spot apically (pls. 20, 24); endosoma sometimes with a lateral spine near secondary gonopore, usually without microtrichiate surface (pls. 21, 25), but phallotheca never with fields of denticles (figs. 61–63, 71–75) 10

9. Secondary gonopore situated subapically in line with approximately straight shaft of endosoma; endosoma with slender, usually proximally oriented, lateral spine, either subtending or at level of secondary gonopore; phallotheca with one or two fields of denticles on posteroventral surface (figs. 20–25, pl. 7) . . . . . *Dicyphylus*

– Secondary gonopore situated at midpoint of endosoma, removed laterad of shaft, with flanking crest, and shaft of endosoma strongly bent to the left; endosoma with apically directed narrow spine originating at level of secondary gonopore (figs. 92, 93, pl. 30) . . . . . *Telophylus*

10. Coloration variable, from almost entirely black to almost entirely pale; antennal segment 2 in male often weakly to strongly swollen, even terete; at least some portion of antenna dark (pl. 24); endosoma with two more or less parallel apical spines, never with a spine at level of secondary gonopore (figs. 71–75, pl. 25) . . . . . *Proteophylus*

– Coloration, including antennae, nearly uniformly lime green (pl. 20); endosoma apically bifid, with a single, sometimes bifid lateral spine at level of secondary gonopore (figs. 61–63, pl. 21) . . . . . *Myrtophylus*

11. Specimens ranging from mostly brown to mostly pale, but especially distal half of hind femur always with dark spots (pl. 16) . . . . . *Halophylus* (in part)

– Coloration variable, but femora never with dark spots 12

12. Uniform green or yellow coloration, including appendages, never with areas of infuscation or other dark markings (pl. 19); body robust, especially head and pronotum; dorsum with dark, recumbent simple setae; endosoma sigmoid with two simple apical spines about length of secondary gonopore (figs. 58, 59, pl. 19) . . . . . *Myoporophylus*

– Usually mostly green or yellow, but often with some dark markings or infuscate areas on hemelytron; body elongate or with length less than 3.00; dorsal vestiture variable; endosomal structure variable, sometimes similar to form seen in *Myoporophylus* 13

13. Elongate, relatively large (body length greater than 4.00), with infuscate markings at apex of corium and apex of membrane cells; dorsum covered with dark, recumbent, simple setae (pl. 3); endosoma sigmoid, with two long, weakly curving, more or less parallel apical spines, and a third much shorter spine (pl. 3); posterior process of left paramere elevated (figs. 6, 7) . . . . . *Austroplagiognathus*

– Coloration often similar to above, but body size usually somewhat smaller (often less than 4.00); vestiture of dorsum variable; structure of male genitalia variable, but never with long parallel spines as in *Austroplagiognathus* 14

14. Size often relatively small, never elongate (pl. 10) but genitalia large; endosoma short, broad, heavily sclerotized; phallotheca often with a dorsal crest (figs. 32–36, pl. 11) . . . . . *Grandivesica*

– Size variable, sometimes elongate but endosoma not as short and broad as in *Grandivesica* 15

15. Endosoma sigmoid, apically with an inflated membranous bag of variable shape, covered with numerous erect spicules, and with a single lateral spine arising at level of secondary gonopore (figs. 82–91, pl. 29). . . . . *Spinivesica*
– Endosoma of variable shape, without an apical, spicule-covered, membranous bag in conjunction with a single lateral spine at level of secondary gonopore 16
16. Body of endosoma twisted, sometimes ropelike, with 2 (or 3) apical spines; membranous covering of endosoma usually evident and with some spicules on apical portion (figs. 37–44, pls. 13, 15). . . . . *Gyrophallus*
– Body of endosoma not so strongly twisted as in *Gyrophallus* and with differing apical spines 17
17. Endosoma with a single robust spine at least as long as or longer than length of secondary gonopore (figs. 54–56, pl. 18); right paramere coming to a distinct point apically (figs. 54–56). . . . . *Monospiniphallus*
– Right paramere with a vaguely to distinctly bifid apex; apex of endosoma with 1 or 2 spines; posterior process of left paramere usually distinctly elevated; if apex of endosoma with a single elongate spine then right paramere broad and distinctly bifid apically. 18
18. Right paramere with a broad, distinctly bifid apex (figs. 13–18). . . . . *Bifidostylus*
– Apex of right paramere not so broad, vaguely bifid 19
19. Endosoma with an elongate apical spine, usually subtended by one or two shorter spines, or sometimes with a single shorter, curving spine (figs. 26–30, pl. 9) . . . . . *Eremotylus*
– Apex of endosoma with one or two short, slender apical spines (figs. 65–69, pl. 23) . . . . . *Omnivoriphylus*

Adunatiphylus, new genus

TYPE SPECIES: *Adunatiphylus kalbarri,* new species.

DIAGNOSIS: Recognized by the moderately elongate body form, short face, and greenish coloration with numerous, more or less uniformly distributed, small, brown spots at setal bases on dorsum (pl. 1). Endosoma elongate moderately slender, J-shaped, endosomal straps fused proximad of secondary gonopore and forming a relatively long, slender apical spine (fig. 2, pl. 1); phallotheca smoothly arched on dorsal margin, with a ridge on posterodistal surface; left paramere roughly quadrate in shape, right paramere large, lanceolate (fig. 1). Female elongate ovoid, frons more strongly bulging than in male. Structure of endosoma and right parameres distinctive, but possibly confused with species of *Asterophylus*, *Halophylus*, *Lepidophylus*, and *Maculiphylus* on the basis of the uniformly spotted dorsum alone. Of these four genera only the last two also feed on *Eremophila* as does *Adunatiphylus*; the absence of scalelike setae and shorter head width (both sexes less than 0.70) will distinguish *Adunatiphylus* from *Lepidophylus* and *Maculiphylus*.

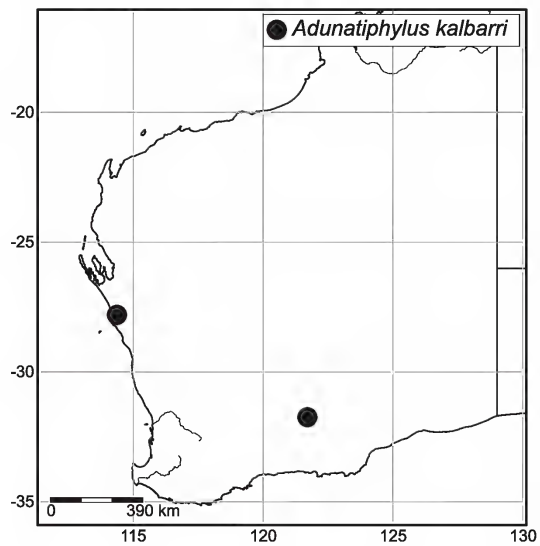
DESCRIPTION: *MALE*: Small, elongate total length 2.79–3.23, pronotum width 0.75–0.85. COLORATION (pl. 1): Body and most of appendages pale green to yellowish, hemelytron and distal half of femora uniformly covered with weakly contrasting small gray-brown spots; antennal segments 3 and 4 heavily infuscate; membrane pale, with two infuscate spots at apex of cells. SURFACE AND VESTITURE (pl. 1): Surface smooth, dull; vestiture of reclining, pale, simple setae. STRUCTURE: **Head:** Transverse, frons broad, only weakly projecting beyond eye in dorsal view; eyes weakly bulging, somewhat removed from anterior margin of pronotum; eyes occupying two-thirds height of head; antennal segment 2 (0.88) moderately long, 1.4 times width of head; antenna inserted just above ventral margin of eye, eye emarginate; labium reaching to apex of mesocoxa. **Thorax:** Pronotum short, broad, trapezoidal, nearly straight sided, calli very weakly expressed; mesoscutum narrowly exposed. *Hemelytron*: Elongate, corium laterally very weakly concave, cuneus elongate triangular. GENITALIA (fig. 2, pl. 1): **Pygophore:** Left dorsal surface with a few bristles. **Endosoma:** J-shaped, secondary gonopore subapical, prominent; ventral strap hyaline medially, sclerotized marginally, terminating basad of secondary gonopore; dorsal strap narrowly attenuate, extending distad of secondary gonopore. **Phallotheca:** Elongate, somewhat broadened apically, strongly sclerotized; posterior surface of apical portion with long gradual crest; aperture elliptical, situated on left anterior surface. **Parameres:** Left paramere boxy, elongate rectangular in dorsal view; posterior process relatively short, apex deflected;

anterior process short, apex reflected. Right paramere elongate lanceolate, apex coming to a point.

Female (pl. 1): Coloration similar to male; body much shorter than in male, ovoid; total length 2.37–2.67, pronotum width 0.76–0.80. Vertex broad, frons swollen and distinctly projecting anterior to eyes in dorsal view. Corium moderately convex laterally, cuneus broadly triangular. GENITALIA (pl. 40): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, projecting beyond anterior edge of dorsal labiate plate. *First gonapophyses*: Moderately large, basal quadrate blocks. *Ventral labiate plate*: Platelike medial anteroventral extension narrow, covering anterior surface of basal structures. **Dorsal labiate plate:** Relatively short longitudinally. *Sclerotized rings*: Moderately large, triangular, thick walled, relatively flat, anterior angle attenuate. *Posteromedial region*: Surface without apparent microstructure. *Anterolateral region*: Not projecting greatly anteriad of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Differentiated from connecting membrane as narrow transverse fold. *Interramal sclerites*: Weakly sclerotized, lateral sclerites wedge shaped, medial sclerite obscure.

Etymology: From the Latin *adunatus*, "united," in reference to the medial fusion of the two endosomal straps, and the generic name *Phylus*; masculine.

Discussion: We treat this taxon as monotypic because of the unique structure of the male genitalia, including among other features the left endosomal strap with fused lateral margins basad of the secondary gonopore and the boxy structure of the left paramere with the strongly deflexed apex of the posterior process. Here we acknowledge the uncanny resemblance in all male genitalic structures of the type species, *Adunatiphylus kalbarri* to *Wallabicoris pultenaei* Schuh and Pedraza (Schuh and Pedraza, 2010: fig. 32). The latter Australian species is assigned to the subtribe Exocarpocorina, based on the results of Menard et al. (2014), including possession of unique folded regions of the posterior wall of the female genitalia as well as DNA sequence data. The pulvilli in all members of *Wallabicoris* are small and completely adhered to the ventral surface of the claw; the dorsal coloration of *W. pultenaei* is a combination of pale green and bright red in contrast to minutely spotted dorsum in *A. kalbarri*. The long pulvilli attached only to the base of the claw and simple posterior wall allow unambiguous placement of *A. kalbarri* in the Cremnorrhinina. We view the remarkable similarity in male genitalia structures of these two unrelated species as an example of parallel development.



Map 1. Distribution of *Adunatiphylus kalbarri*.

Adunatiphylus kalbarri, new species
Figure 2, map 1, table 1, plates 1, 40

Diagnosis: Known only from the type species and therefore recognized by the characters in the generic diagnosis.

Description: *Male*: As in generic description.

Female: As in generic description.

Etymology: Named for the Kalbarri National Park, Western Australia, the type locality; a noun in apposition.

Hosts: Recorded from *Eremophila dempsteri* (pl. 37F) and *Eremophila glabra tomentosa* (Scrophulariaceae).

Distribution (map 1): Known from the Kalbarri National Park north of Perth and from the Gold Fields region of Western Australia.

Discussion: See generic discussion.

Holotype: **AUSTRALIA: Western Australia:** Kalbarri National Park, 22.9 km E Kalbarri,

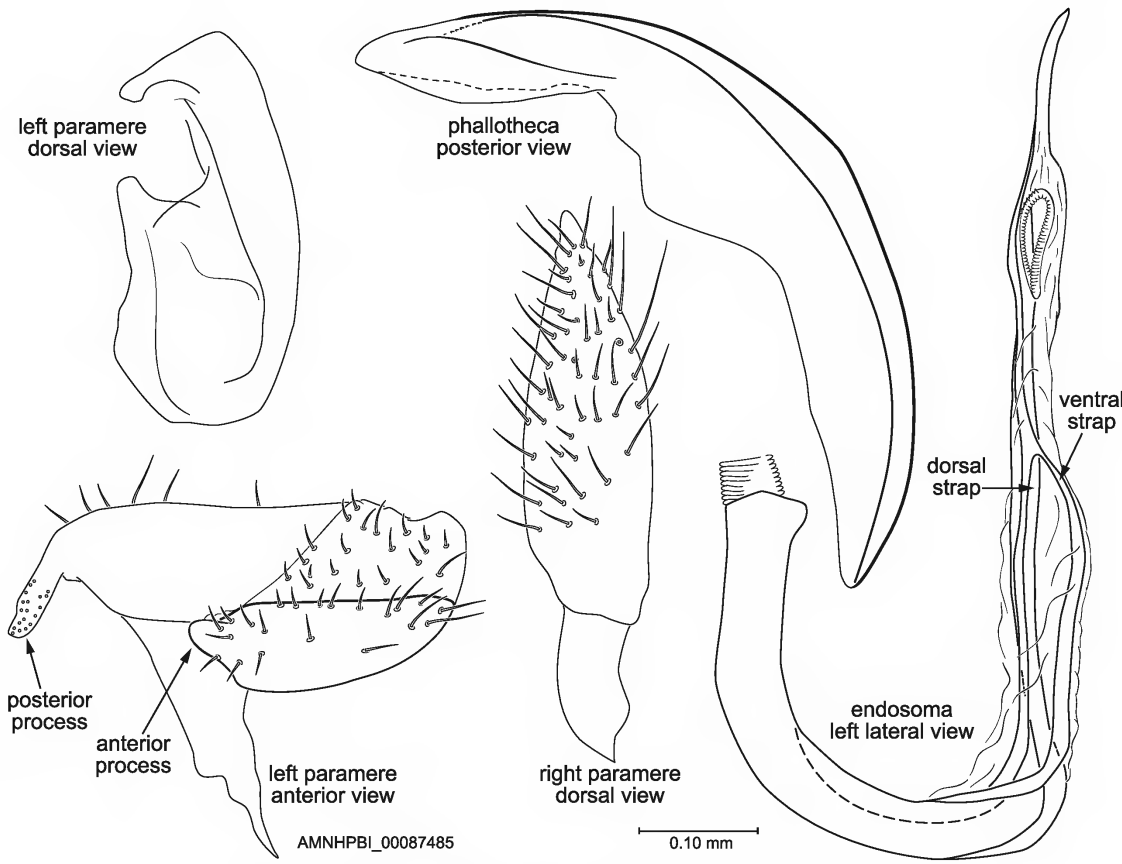


Fig. 2. Male genitalic structures of *Adunatiphylus kalbarri.*

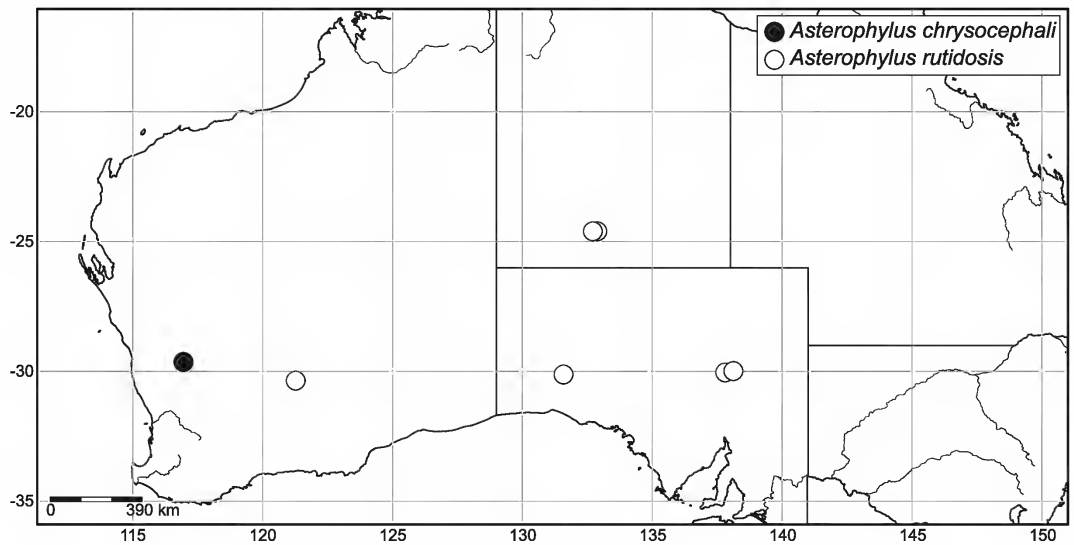
27.75408°S 114.3711°E, 500 m, 29 Oct 1996, Schuh and Cassis, *Eremophila glabra* (R. Br.) Ostenf. *tomentosa* (Scrophulariaceae), det. PERTH staff PERTH 05120438, 1♂ (AMNH_PBI 00087280) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 49 km S of Kambalda Road Jct. on Coolgardie-Esperance Hiway, 31.7171°S 121.6906°E, 300 m, 19 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila dempsteri* F. Muell. (Scrophulariaceae), det. Field ID, 5♂ (00389575–00389579) (AM). Kalbarri National Park, 22.9 km E Kalbarri, 27.75408°S 114.3711°E, 500 m, 29 Oct 1996, Schuh and Cassis, *Eremophila glabra* (R. Br.) Ostenf. *tomentosa* (Scrophulariaceae), det. PERTH staff PERTH 05120438, 3♂ (00087485, 00389631, 00389724), 19♀ (00389637–00389645, 00389648, 00389649, 00389651, 00389653, 00389654, 00389659–00389663) (AM), 2♂ (00389632, 00389652), 9♀ (00389634, 00389636, 00389646, 00389647, 00389650, 00389655–00389658) (AMNH), 1♀ (00087279), 1♂ (00389630) (UNSW), 5♀ (00389633, 00389635, 00389725–00389727) (WAMP).

Asterophylus, new genus

TYPE SPECIES: *Asterophylus rutidosis,* new species.

DIAGNOSIS: Male recognized by the elongate, slender, parallel-sided body, pale to almost white coloration, and more or less uniformly distributed spots on dorsum and femora (pl. 2);. endosoma sigmoid, with or without an obvious secondary gonopore; phallotheca slender apically (figs. 4, 5, pl. 2). Sexual dimorphism strong to very strong, female ranging from elongate ovoid to having a truncate hemelytron with apex of abdomen exposed. Among the other taxa with a uniformly spotted dorsum, *Adunatiphylus*, *Halophylus*,



Map 2. Distribution of *Asterophylus* spp.

Lepidophylus, and *Maculiphylus*; most easily confused with pale *Halophylus* species, but easily separated on the basis of the broader body form and distinctive endosomal structure in *Halophylus* (fig. 16).

DESCRIPTION: *MALE*: Total length 2.50–3.82, pronotum width 0.76–0.98. COLORATION (pl. 2): White to weakly yellowish with scattered small spots on dorsum and distal half of hind femur; appendages somewhat darker than body coloration. SURFACE AND VESTITURE (fig. 3A, B): Smooth, dull; dorsum with reclining, pale, simple setae, and at least sometimes with apically bident setae on head and pronotum. STRUCTURE: **Head** (fig. 3A): Eyes relatively large, vertex relatively narrow; frons weakly projecting anterior to eyes in dorsal view. **Thorax:** Pronotum short, flattened, trapezoidal, nearly straight sided, lateral margins strongly angled anteromedially; calli weakly expressed. *Hemelytron*: Greatly elongate relative to head and pronotum, corium elongate, costal margin nearly straight, cuneus elongate triangular. GENITALIA (figs. 4, 5, pl. 2): **Pygophore:** With a few pale or dark bristles left and right of aperture. **Endosoma:** Sigmoid, apical one-half variously bent to left; secondary gonopore either subapical and moderately prominent or absent; dorsal and ventral straps either equal or subequal in length; membranous sheath distad of secondary gonopore serrate or smooth; apex of endosoma narrowed and with small membrane or merging to pointed apex. **Phallotheca:** Conical, anterior surface of apical portion with narrow elliptical aperture, border of aperture strongly sclerotized. **Parameres:** Left paramere typically phyline with dorsoposterior margin variably elevated above anterior and posterior processes, long anterior seta medial to short anterior process. Right paramere relatively large and elongate, apex with one broad point and one subapical anterolateral prominence.

FEMALE (pl. 2): Shorter, more robust than male, ranging from submacropterous and elongate ovoid to brachypterous with completely reduced membrane and exposed apex of abdomen; total length 2.22–3.32, pronotum width 0.76–0.94. Eyes smaller than in male, face moderately to distinctly swollen and projecting beyond anterior margin of eyes in dorsal view. GENITALIA (pl. 41): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, attaining anterior edge of dorsal labiate plate. *First gonapophyses*: Moderate sized, wedge-shaped basal blocks. *Ventral labiate plate*: Platelike medial anteroventral extension narrow, covering anterior surface of basal structures. **Dorsal labiate plate:** Relatively short longitudinally. *Sclerotized rings*: Moderately large, triangular, thick walled, relatively flat, anterior angle attenuate to strongly attenuate. *Posteromedial*

region: Surface without apparent microstructure. *Anterolateral region*: Slightly projecting anteriad of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Not differentiated from connecting membrane. *Interramal sclerites*: Relatively strongly sclerotized, lateral and medial sclerites wedge shaped.

ETYMOLOGY: From the generic name *Aster*, in reference to Asteraceae, the primary host family for the group, and the generic name *Phylus*; masculine.

Asterophylus chrysocephali, new species
Figures 3, 4, map 2, table 1, plates 2, 41B, G

DIAGNOSIS: Among *Asterophylus* species recognized by the easily visible secondary gonopore and the serrate membranous surface distad of the gonopore; hemelytral membrane white.

DESCRIPTION: *MALE*: Total length 2.96–3.79, pronotum width 0.80–0.98. COLORATION (pl. 2): Pale, weakly yellow, appendages more strongly so and darker than dorsum; dark spots at inner angle of cuneus and at apex of membrane cells, in addition to small spots on remainder of hemelytron, membrane otherwise white. SURFACE AND VESTITURE (figs. 3A, B): Surface smooth and dull, covered with reclining, pale, simple setae and with apically bident setae on head and pronotum. STRUCTURE: **Head** (fig. 3A): Frons weakly swollen and projecting anterior to eyes; eyes occupying two-thirds of height of head; antenna inserted just above ventral margin of eye, eye emarginate; antennal segment 2 long (1.03), 1.51 times width of head; labium reaching to apex of mesocoxa. **Thorax** (fig. 3A): As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 4, pl. 2): **Pygophore:** With a few bristles left and right of aperture. **Endosoma:** Sigmoid, distal one-half strongly bent to left; secondary gonopore subapical, moderately prominent; ventral strap subequal in length to dorsal strap; membranal sheath distad of secondary gonopore serrate; apex of endosoma narrowed and with small membrane. **Phallotheca:** As in generic description. **Parameres:** As in generic description.

FEMALE (pl. 2): Elongate ovoid, submacropterous, shorter than male; total length 2.84–3.32, pronotum width 0.85–0.94.

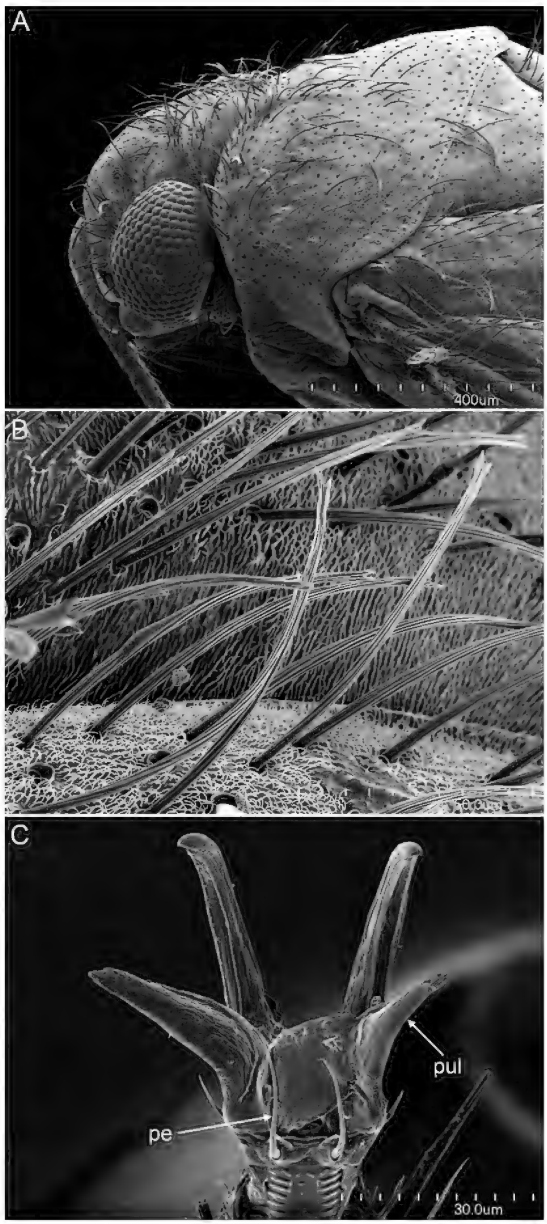


Fig. 3. *Asterophylus chrysocephali*. Scanning electron micrographs. **A**. Lateral view of head and pronotum. **B**. Detail view of specialized setae with "bident" apex on head and pronotum. **C**. Ventral view of pretarsus. Abbreviations: **pe,** parempodium; **pul,** pulvillus.

Coloration as in male. Eyes smaller than in male, frons weakly swollen and only weakly projecting anterior to eyes. GENITALIA as in plate 41B, G.

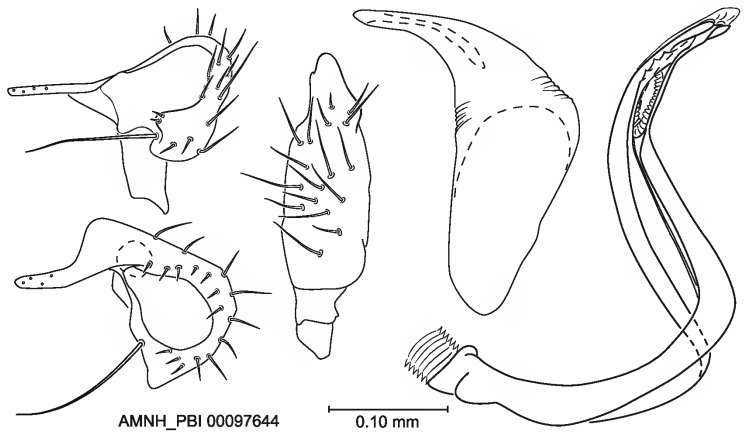


Fig. 4. Male genitalic structures of *Asterophylus chrysocephali.*

ETYMOLOGY: Named for the asteraceous genus *Chrysocephalum*, one of the known hosts.

HOSTS: Recorded from *Chrysocephalum apiculatum*, *C. eremaeum*, and *Leucochrysum stipitatum* (pl. 31C) (Asteraceae).

DISTRIBUTION (map 2): Known from the Alice Springs area of central Australia and adjacent western Queensland.

HOLOTYPE: **AUSTRALIA: Northern Territory:** 78 km S of Alice Springs at jct of Rainbow Valley Rd and Stuart Hiway, 24.23334°S 133.4567°E, 540 m, 27 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Chrysocephalum apiculatum* (Labill.) Steetz. (Asteraceae), det. NSW staff NSW658372, 1♂ (AMNH_PBI 00097648) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 13.5 km E of Stuart Hiway on Horseshoe Bend Rd, 25.13334°S 133.2999°E, 464 m, 28 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Chrysocephalum eremaeum* Anderb. (Asteraceae), det. NSW staff NSW658396, 18♂ (00098504–00098506, 00098458–00098470, 00391081, 00391082), 35♀ (00098507–00098511, 00098472–00098500, 00098503) (AM), 2♀ (00098501, 00098502), 1♂ (00098471) (AMNH). 26.8 km W of Tanami Rd on Mt Wedge Station Rd, 22.50001°S 132.179°E, 589 m, 23 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Leucochrysum stipitatum* (F. Muell.) P.G. Wilson (Asteraceae), det. NSW staff NSW658311, 1♂ (00391084) (AM), 8♂ (00098894–00098899, 00098902, 00098904), 18♀ (00098906–00098923) (AMNH), 1♂ (00098903) (ANIC), 1♂ (00098901) (CNC), 4♂ (00098924–00098927), 5♀ (00098928–00098932) (MNT), 1♂ (00098905) (USNM), 1♂ (00098900) (ZISP). 78 km S of Alice Springs at jct of Rainbow Valley Rd and Stuart Hiway, 24.23334°S 133.4567°E, 540 m, 27 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Chrysocephalum apiculatum* (Labill.) Steetz. (Asteraceae), det. NSW staff NSW658372, 1♂ (00391079) (AM), 23♂ (00097636–00097642, 00097645, 00097647, 00097649, 00097697–00097699, 00097677–00097683, 00097126, 00097644, 00097646), 45♀ (00097650–00097667, 00097670, 00097673, 00097700–00097708, 00097684–00097696, 00097127, 00097675, 00097676) (AMNH), 5♀ (00097668, 00097669, 00097671, 00097672, 00097674) (MNT). ~66 km N of Lasseter Hiway on Luritja Road, 24.68335°S 132.3212°E, 545 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Chrysocephalum apiculatum* (Labill.) Steetz. (Asteraceae), det. NSW staff NSW666297, 1♂ (00391080) (AM), 4♂ (00097741–00097744), 13♀ (00097745–00097757) (AMNH), 2♀ (00097762, 00097763) (ANIC), 2♀ (00097760, 00097761) (CNC), 2♀ (00097764, 00097765) (USNM), 2♀ (00097758, 00097759) (ZISP). ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Chrysocephalum apiculatum* (Labill.) Steetz. (Asteraceae), det. NSW staff NSW666256, 15♀ (00098594–00098608), 1♂ (00391083) (AM). **Queensland:** 75.7 km W of Windorah, 25.37703°S 141.9457°E, 250 m, 03 Nov 1998, Schuh, Cassis, Silveira, *Chrysocephalum apiculatum* (Labill.) Steetz. (Asteraceae), det. Royal

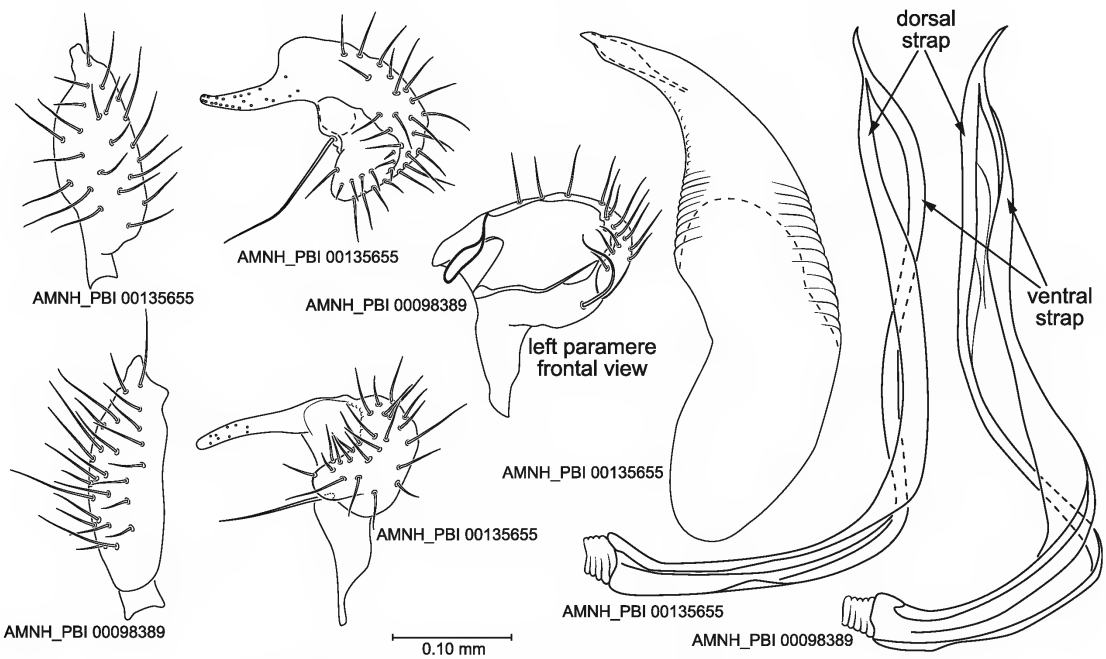


Fig. 5. Male genitalic structures of *Asterophylus rutidosis*.

Bot Gard. NSW NSW427518, 1♂ (00130586), 6♀ (00130588–00130592, 00414294) (AMNH).

Asterophylus rutidosis, new species
Figure 5, map 2, table 1, plates 2, 41A, C–F

Diagnosis: Among *Asterophylus* species recognized by apparent absence of secondary gonopore (fig. 4, pl. 2) and absence of serration on membranal surface of endosomal straps distad of gonopore; membrane of hemelytron broadly infuscate in contrast to *A. chrysocephali* (pl. 2).

Description: *Male*: Total length 2.50–3.82, pronotum width 0.76–0.90. COLORATION (pl. 2): Pale, nearly white, except for small brownish spots; membrane broadly infuscate. SURFACE AND VESTITURE (pl. 2) Body surface smooth, dull. STRUCTURE: **Head** (pl. 2): Frons very weakly swollen and only slightly projecting anterior to eyes in dorsal view; eyes occupying just under two-thirds height of head; antennal segment 2 moderately long (0.92), 1.4 times width of head; labium reaching to apex of mesocoxa. **Thorax:** As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 4, pl. 2): **Pygophore:** With a few pale bristles left and right of aperture. **Endosoma:** Sigmoid, distal one-half moderately bent to left; secondary gonopore apparently absent; dorsal and ventral straps of equal length, merging terminally at pointed apex. **Phallotheca:** As in generic description. **Parameres:** As in generic description.

Female (pl. 2): Elongate to broadly ovoid when submacropterous, sometimes strongly brachypterous and lacking membrane, leaving apex of abdomen exposed; total length 2.22–3.19, pronotum width 0.76–0.91. Coloration as in male. Eyes smaller than in male, frons weakly to moderately swollen, weakly to distinctly projecting anterior to eyes. GENITALIA as in plate 41A, C–F.

Etymology: Named for the asteraceous genus *Rutidosis*, one of the known hosts.

Hosts: Recorded from *Chrysocephalum puteale* (pl. 31B), *Ixiolaena leptolepis*, and *Rutidosis helichrysoides* (pl. 31D) (Asteraceae).

Distribution (map 2): Known from the Alice Springs area of central Australia, South Australia, and the Gold Fields region of Western Australia.

Discussion: Although this taxon shows substantial variation in size and degree of alary

sexual dimorphism, the consistent structure of the male genitalia suggests that a single taxon is involved.

HOLOTYPE: **AUSTRALIA: Northern Territory:**~44 km W of Stuart Hiway on Ernest Giles Rd, 24.56668°S 132.6815°E, 494 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Rutidosis helichrysoides* DC. (Asteraceae), det. NSW staff NSW666245, 1♂ (AMNH_PBI 00098376) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 21 km W of Stuart Hiway on Ernest Giles Rd, 24.56668°S 132.8539°E, 471 m, 29 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Rutidosis helichrysoides* DC. (Asteraceae), det. NSW staff NSW658415, 1♂ (00098300), 4♀ (00098301–00098304) (AMNH). ~44 km W of Stuart Hiway on Ernest Giles Rd, 24.56668°S 132.6815°E, 494 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Rutidosis helichrysoides* DC. (Asteraceae), det. NSW staff NSW666245, 19♂ (00098369–00098375, 00098377–00098386, 00097157, 00391085), 34♀ (00098391–00098397, 00098404–00098429, 00097158) (AM), 3♀ (00098403, 00098400, 00098401), 2♂ (00098389, 00098390) (AMNH), 2♂ (00098387, 00098388), 2♀ (00098398, 00098399) (MNT). **South Australia:** Maralinga Village, 30.158°S 131.579°E, Aug 1956 – Oct 1956, F.L. Hill, 2♂ (00173977, 00173978) (BMNH). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.01028°S 137.77611°E, 209 m, 13 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♂ (00414497) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.9768°S 138.08716°E, 149 m, 11 Oct 2010, A. Namyatova, 1♂ (00414496), host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♀ (00414498) (UNSW). **Western Australia:** 49.1 km N of Norseman, 30.32116°S 121.2851°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Chrysocephalum puteale* (S.Moore) Paul G. Wilson (Asteraceae), det. PERTH staff PERTH 05056500, 3♂ (00388763–00388765), 14♀ (00388766–00388779) (WAMP). 53.9 km N of Kalgoorlie, 30.28882°S 121.2558°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Ixiolaena leptolepis* (DC.) Benth. (Asteraceae), det. PERTH staff PERTH 05099927, 13♂ (00389339–00389349, 00087204, 00087464), 21♀ (00389351–00389370, 00087205) (AM), 4♂ (00135656–00135658, 00135655), 15♀ (00135661–00135675). Host unknown, 2♀ (00412910, 00412911) (AMNH).

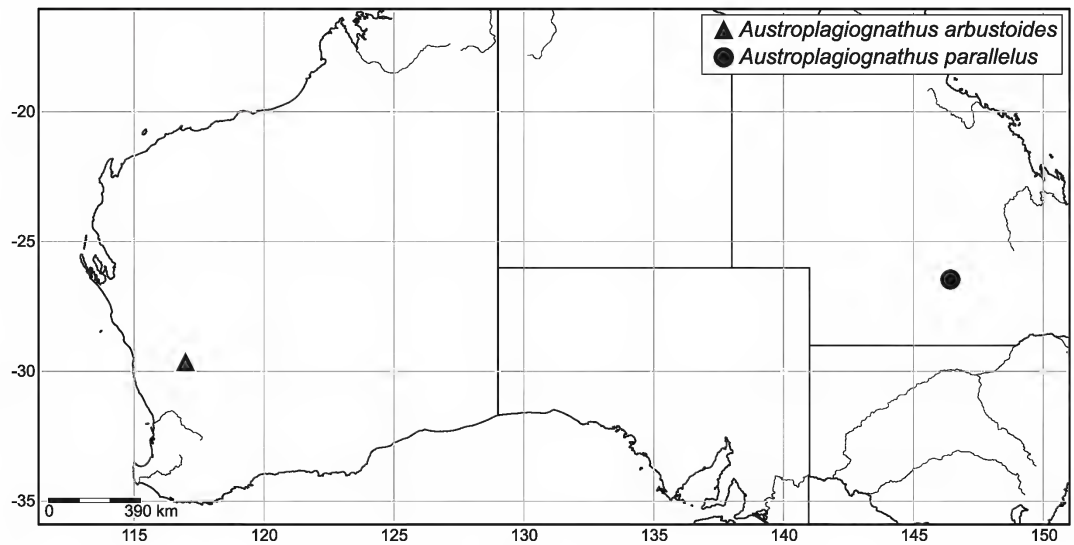
OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** 53.9 km N of Kalgoorlie, 30.28882°S 121.2558°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Ixiolaena leptolepis* (DC.) Benth. (Asteraceae), det. PERTH staff PERTH 05099927, 1 nymph (00389350) (AM), 2 nymphs (00135659, 00135660) (AMNH).

Austroplagiognathus, new genus

TYPE SPECIES: *Austroplagiognathus parallelus,* new species.

DIAGNOSIS: Male recognized by the elongate, parallel-sided body form, green to pale general coloration, presence of a dark, somewhat diffuse, spot on the corium near the inner angle of the cuneus and at the apex of the membrane cells (pl. 3) and uniquely by the two, very long, nearly parallel-sided apical endosomal spines lying nearly parallel to one another (figs. 6, 7, pl. 3). Potentially confused with *Gyrophallus* spp. (pls. 12, 14) on relatively large size, parallel-sided body form, and general coloration—including two pairs of dark spots on the dorsum—but male genitalia of *Austroplagiognathus* distinctive with two, long, nearly parallel, apical endosomal spines.

DESCRIPTION: *MALE*: Total length 4.10–5.70, pronotum width 0.98–1.38. COLORATION (pl. 3): Green or yellowish (in preserved specimens); spot on corium near inner angle of cuneus and at apex of membrane cells; membrane weakly to strongly infuscate; distal half of hind femur without dark spots. SURFACE AND VESTITURE: Body surface smooth, weakly polished, weakly shining. Dorsum covered with reclining, dark, simple setae. STRUCTURE: **Head:** Vertex narrow to somewhat broad, frons barely projecting anterior to eyes in dorsal view. **Thorax:** Calli weakly differentiated; posterior lobe of pronotum weakly to moderately swollen and elevated, lateral margins straight to weakly convex, posterior margin weakly excavate; mesoscutum broadly exposed. *Hemelytron*: Moderately to distinctly elongate, costal margin very weakly convex, cuneus elongate triangular. GENITALIA (figs. 6, 7, pl. 3): **Pygophore:** Either broadly or elongate conical, posterior margin truncate. **Endosoma:** Sigmoid, distal one-half sometimes strongly bent to left; secondary gonopore situated at junction of



Map 3. Distribution of *Austroplagiognathus* spp.

diverging, equal length, long or moderately long, dorsal and ventral straps; straps more or less parallel; ventral strap bifid with a long spine and a short spine distad of secondary gonopore, short spine situated medially or adjacent to secondary gonopore; apical endosomal membrane of variable structure. **Phallotheca:** Moderately large or broad with ventral outpocket; aperture variable, situated on anterior surface. **Parameres:** Left paramere slightly compressed mediolaterally in dorsal view; dorsoposterior margin variably elevated dorsad of anterior and posterior processes, anterior and posterior processes of variable length; long seta situated lateral of anterior process. Right paramere of variable size, apex with one long point and one lateral prominence.

Female: Unknown.

Etymology: From the Latin *auster*, "south," and the generic name *Plagiognathus*, in reference to the structure of the endosoma; masculine.

Discussion: Our ability to characterize variation in this taxon is limited because both known species are described on the basis of single specimens.

Austroplagiognathus arbustoides, new species
Figure 6, map 3, table 1, plate 3

Diagnosis: Recognized by the elongate body form, conspicuously green head, pronotum, and scutellum, swollen posterior lobe of the pronotum, hemelytron with strongly infuscate spots at inner angle of the cuneus and at the apex of the membrane cells, strongly infuscate membrane, and structure of the male genitalia; endosoma with two apical spines of structure similar to that seen in *Plagiognathus arbustorum* (Fabricius), but also with a shorter spine extending from the distal margin of the secondary gonopore by about the length of the gonopore.

Description: *Male*: Total length 5.70, pronotum width 1.38. COLORATION (pl. 3): Head, pronotum, and scutellum distinctly green; mesoscutum orange; corium, clavus, and cuneus almost transparent, weakly infuscate, membrane rather strongly infuscate; otherwise as in generic description. SURFACE AND VESTITURE (pl. 3): As in generic description. STRUCTURE: **Head** (pl. 3): Eyes relatively large, vertex narrow; eye occupying just less than three-quarters of height of head; antenna inserted above ventral margin of eye by diameter of fossa, eye not emarginate; antennal segment 2 long (1.50), 1.65 times width of head; labium reaching posterior apex of procoxa. **Thorax** (pl. 3): Posterior lobe of pronotum distinctly swollen, lateral margins convex. *Hemelytron*: Distinctly elongate. GENITALIA (fig. 6, pl. 3): **Pygophore:** Elongate.

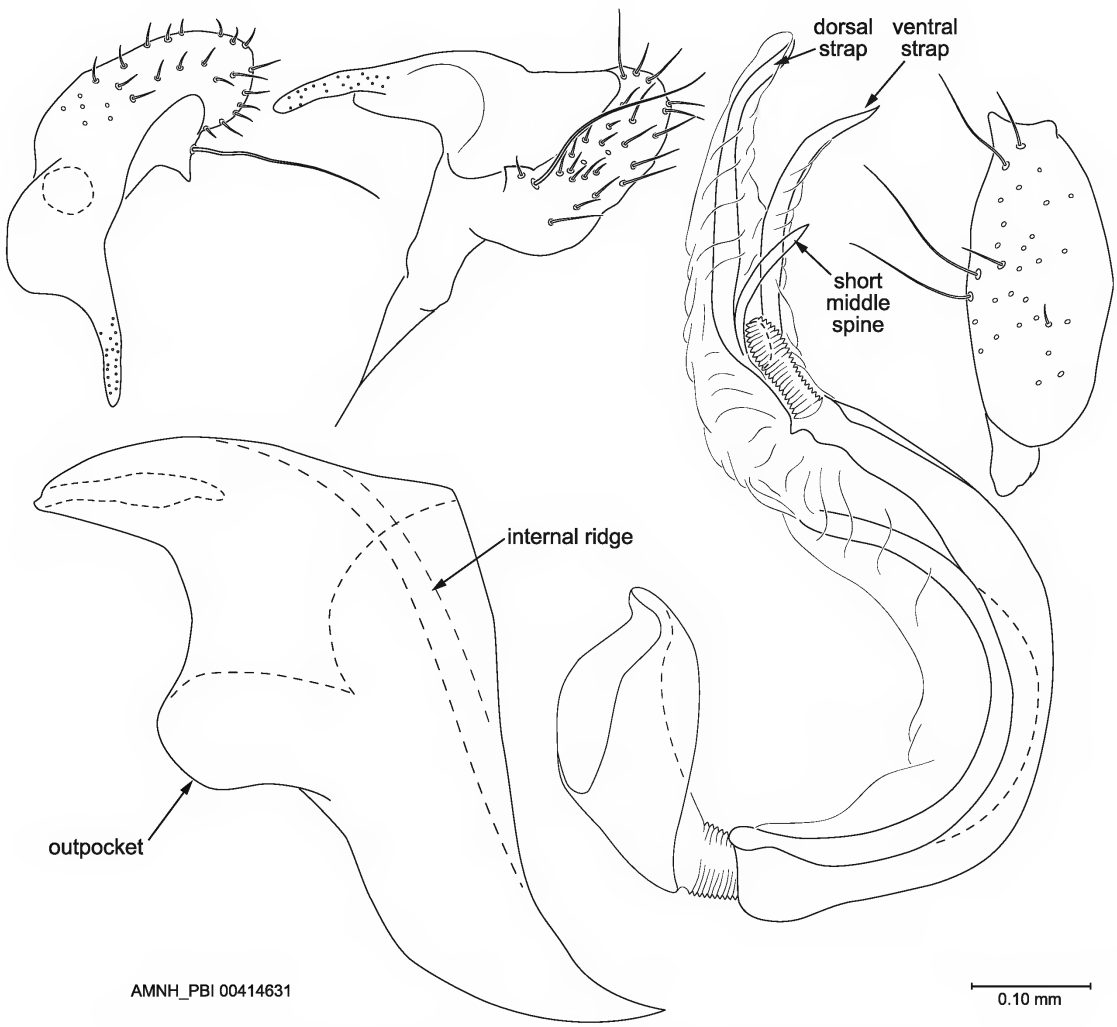


Fig. 6. Male genitalic structures of *Austroplagiognathus arbustoides*.

Endosoma: Distal portion slightly bent to left; dorsal and ventral straps moderately long; ventral strap bifid with long and short spine distad of secondary gonopore, short spine situated medial to long apical spines, long spine of dorsal strap with extensive membrane forming dorsal surface; long apical spines of equal length. **Phallotheca:** Broad with large ventral outpocket basally and strong internal ridge; aperture ovoid. **Parameres:** Left paramere with dorsoposterior margin moderately elevated, posterior process straight, anterior process minute. Right paramere moderately large, apex with one point and a lateral prominence.

Female: Unknown.

Etymology: Named after *Plagiognathus arbustorum*, the type species of *Plagiognathus*, in recognition of the similarity of appearance of the endosoma in the two species.

Host: Recorded from *Eremophila clarkei* (pl. 37D, E) (Scrophulariaceae).

Distribution (map 3): Known only from the Charles Darwin Nature Reserve, the type locality in Western Australia, about 350 km NNE of Perth.

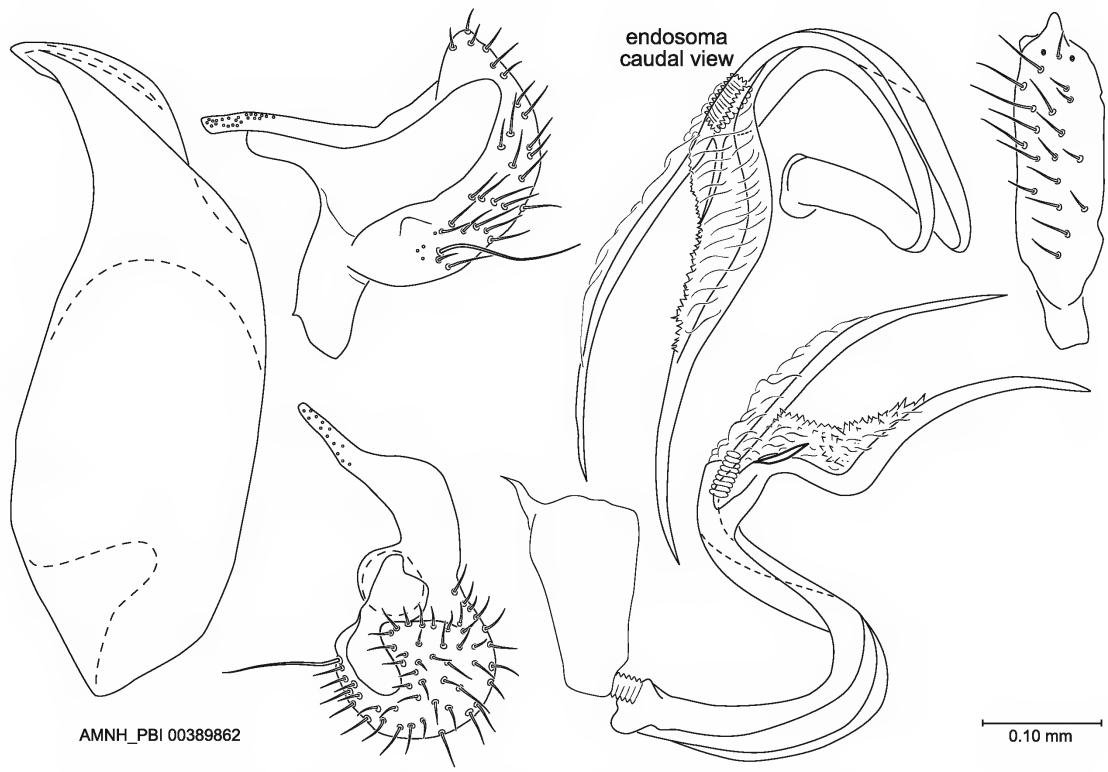


Fig. 7. Male genitalic structures of *Austroplagiognathus parallelus*.

HOLOTYPE: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, granite outcrop SW of homestead, 29.59261°S 116.94791°E, 312 m, 21 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00414631) (WAMP).

Austroplagiognathus parallelus, new species
Figure 7, map 3, table 1, plate 3

DIAGNOSIS: Recognized by the moderately elongate body form, overall yellowish coloration in only known specimen, the somewhat flattened and straight-sided posterior lobe of the pronotum, the hemelytron with weakly infuscate spots at the inner angle of the cuneus and at the apex of the membrane cells, the pale membrane (pl. 3), and the structure of the male genitalia, the endosoma with two greatly elongate, apically curved, nearly parallel-sided apical spines and a much shorter, weakly developed spine arising from the endosomal membrane just distad of secondary gonopore and extending by about the length of the gonopore (fig. 7). Distinguished from *A. arbustoides* by the much smaller size and the configuration of the apical endosomal spines.

DESCRIPTION: *MALE*: Total length 4.10, pronotum width 0.98. COLORATION (pl. 3): Yellowish (in preserved specimen), with diffuse infuscate spots at inner angle of cuneus and at apex of membrane cells. SURFACE AND VESTITURE (pl. 3): As in generic description. STRUCTURE: **Head** (pl. 3): Vertex relatively broad, frons weakly swollen and slightly projecting beyond eyes in dorsal view; eye occupying two-thirds of height of head; antennae inserted just above ventral margin of eye, eye not emarginate; antennal segment 2 long (1.19), 1.75 times width of head; labium reaching base of mesocoxa. **Thorax** (pl. 3): Calli moderately distinct, posterior lobe of pronotum weakly swollen, lateral margins straight. *Hemelytron*: Moderately elongate, cuneus elongate triangular,

but not strongly so. GENITALIA (fig. 7, pl. 3): **Pygophore:** Broad. **Endosoma:** Sigmoid, distal one-half strongly bent to left, dorsal and ventral straps conspicuously parallel and long; ventral strap bifid with long, deeply curved medial spine and straight, very short, spine distad of secondary gonopore; apical spines of roughly equal length; membrane present between bases of dorsal and ventral apical spines. **Phallotheca:** Moderate large and with elongate narrow aperture. **Parameres:** Left paramere with dorsoposterior margin strongly elevated and with broadly pointed prominence, posterior process relatively short, straight, anterior process subobsolete. Right paramere of moderate size, with an apical point and a posterolateral prominence.

Female: Unknown.

Etymology: From the Greek, *parallelus*, in recognition of the structure of the apical endosomal spines.

Host: Unknown.

Distribution (map 3): Known only from the type locality near Charleville in western Queensland.

Discussion: The holotype, the only known specimen, is yellowish in coloration, which may be in part the result of the way it was killed and preserved.

Holotype: **AUSTRALIA: Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, 1♂ (AMNH_PBI 00389862) (QM).

Bifidostylus, new genus

Type Species: *Bifidostylus silveirae,* new species.

Diagnosis: Moderately to strongly elongate, parallel sided. Coloration of dorsum often nearly uniform (except *B. agnew* and *B. cassisi*) and never with pairs of dark spots at apex of corium and apex of membrane cells (pl. 4). Right paramere with a bifid apex, as seen in *Europiella* Reuter from the Northern Hemisphere; left paramere with an undulating posterior margin and posterior process; endosoma J-shaped to weakly sigmoid, without spines arising laterally and without membranous ornamentation apically, but distinctly bifid apically in some species; phallotheca usually greatly elongate on basal portion (figs. 9–18). Sexual dimorphism moderate, female somewhat shorter and more strongly ovoid than male (pl. 4). Most easily confused with *Monospiniphallus*, *Eremotylus,* and *Myrtophylus* on basis of uniform green coloration of dorsum (except in *B. agnew* and *B. cassisi*), but distinguished from all of those taxa by structure of right paramere with a bifid apex.

Description: *Male*: Moderately to strongly elongate, parallel sided; total length 2.96–5.15, pronotum width 0.83–1.23. COLORATION (pl. 4): Often nearly uniform green, including appendages, never with dark spot on corium at inner angle of cuneus and at apex of membrane cells, although membrane frequently infuscate; *B. agnew* and *B. cassisi* with longitudinal reddish or infuscate markings on hemelytron and with antennal segment 1 and parts of segment 2 nearly black. SURFACE AND VESTITURE (fig. 8A, B, pl. 4): Body surface smooth, sometimes weakly granulate, dull to weakly shining; dorsum with short to long reclining common setae. STRUCTURE: **Head** (fig. 8A, B): Eyes usually large, head broad with broad vertex, eyes sometimes smaller and head not so broad; frons at most weakly swollen and only slightly protruding beyond anterior margin of eye. **Thorax** (fig. 8A): *Hemelytron*: Relatively short to strongly elongate, usually nearly parallel sided with costal margin nearly straight; cuneus ranging from short and relatively broad to strongly elongate triangular and slender; thoracic pleuron as in figure 8D. Pretarsus as in figure 8F. GENITALIA (figs. 9–18, pl. 5): **Pygophore:** Posterior margin truncate; broadly or elongate conical or triangular, sometimes dorsal surface with tubercles of variable size and distribution or with bristles. **Endosoma:** J-shaped, sometimes weakly sigmoid, without lateral, proximally directed spines, sometimes with apical membrane, but never with spicules or microtrichia on membrane; endosoma sometimes distinctly narrow with single pointed apical spine, or variously bifid apically, rarely with undulating straps; secondary gonopore narrow, weakly sclerotized and of variable length, or well sclerotized and ringlike, rarely absent. **Phallotheca:**

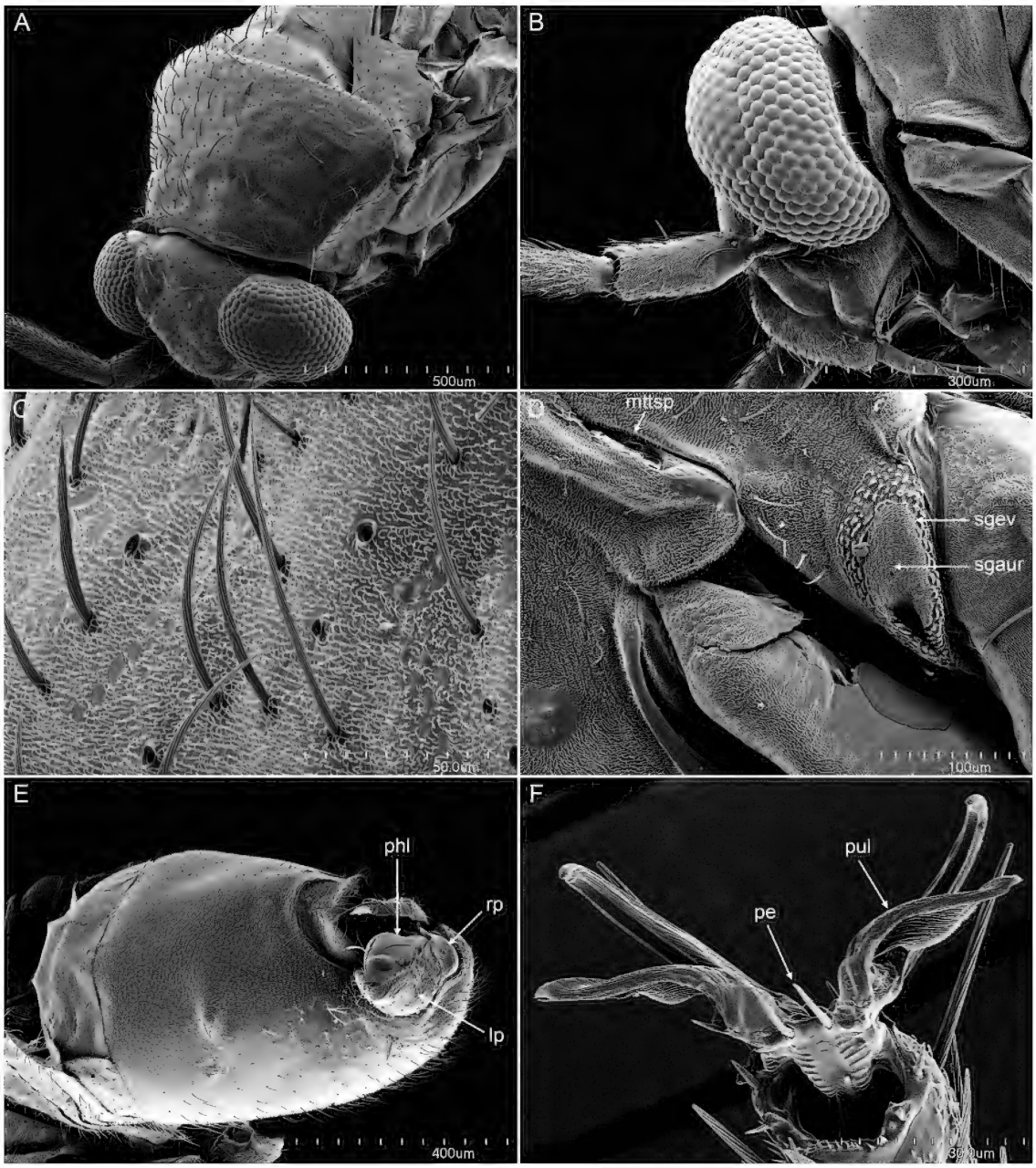
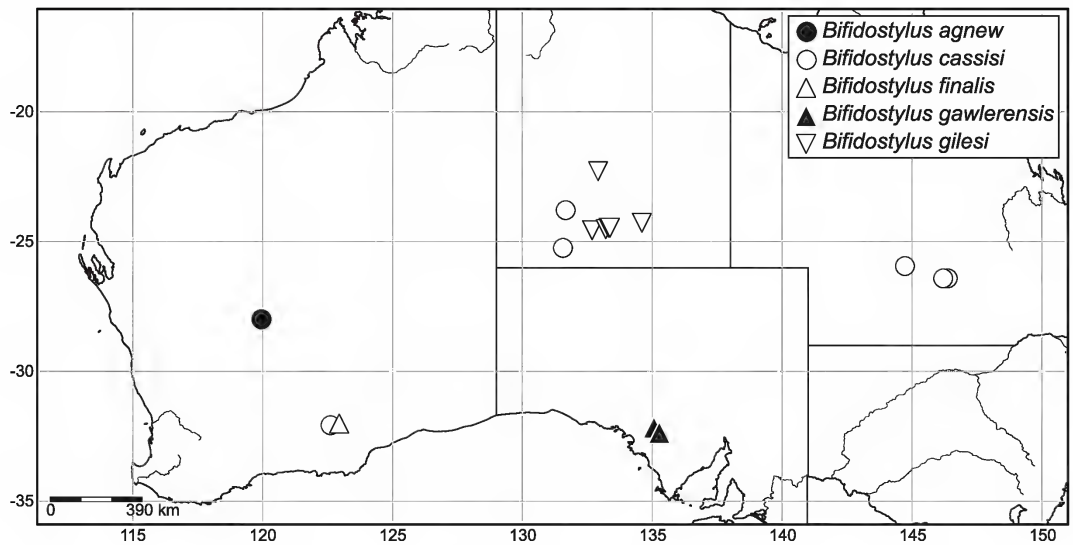


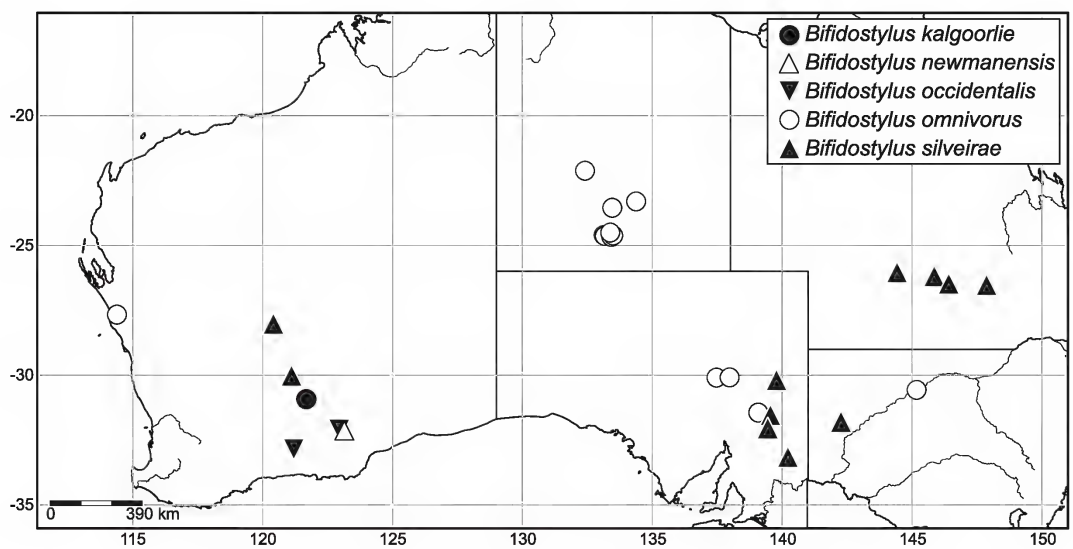
Fig. 8. *Bifidostylus silveirae*. Scanning electron micrographs. **A**. Dorsofrontal view of head and pronotum. **B**. Lateral view of head, showing structural details common to most Australian Cremnorrhinina. **C.** Detail of pronotal setae. **D.** Thoracic pleuron, showing metathoracic spiracle opening, metathoracic scent-gland auricle, and evaporatory area. **E.** Posterolateral view of pygophore. **F**. Frontoventral view of pretarsus. Abbreviations: **mttsp,** metathoracic spiracle; **lp,** left paramere; **pe,** parempodium; **phl,** phallotheca; **pul**, pulvillus; **rp,** right paramere; **sgaur,** scent gland auricle; **sgev,** scent gland evaporatory area.



Map 4. Distribution of *Bifidostylus agnew–B. gilesi.*

Posterior apical portion variously conical, elongate or pitcher shaped; aperture of variable size, situated on dorsal surface of anterior aspect, rarely with basal outpocket; basal portion usually greatly elongate. **Parameres:** Typically phyline, dorsoposterior margin usually undulating, elevated dorsad of posterior and anterior processes, sometimes not raised; posterior process usually bent or undulating; anterior process minute and barely protruding from anterior contour of paramere. Right paramere usually elongate, sometimes shorter and slightly swollen, usually with bifid apex, rarely with single point apically.

Female (pl. 4): Body short, more robust than in male, more strongly ovoid, total length 2.87–4.51, pronotum width 0.82–1.22.



Map 5. Distribution of *Bifidostylus kalgoorlie–B.silveirae.*

Coloration similar to male. Eyes smaller than in male, vertex wider, usually more strongly protruding beyond anterior margin of eye. GENITALIA (pl. 42): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, reaching to level of sclerotized rings. *First gonapophyses*: Small to moderate size, wedge-shaped or elongate basal blocks. *Ventral labiate plate*: Platelike medial anteroventral extension relatively wide, extending lateral of anterior surface of basal structures. **Dorsal labiate plate:** Long longitudinally. *Sclerotized rings*: Medium size, gently concave, triangular, anterior and posterior angles strongly attenuate. *Posteromedial region*: Surface with microstructure. *Anterolateral region*: Strongly projecting anteriad of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Not differentiated from connecting membrane. *Interramal sclerites*: Faintly sclerotized, lateral sclerites narrow, medial sclerite apparently absent.

Etymology: From the Latin, *bifidus*, "forked," and *stylus*, "pointed instrument," in reference to the right paramere; masculine.

Discussion: The most consistent features in this genus are in the structure of the male genitalia, particularly the bifid apex of the right paramere and the elongate basal portion of the phallotheca that attaches to the pygophore (figs. 9–18). The endosoma is usually J-shaped, although it is sigmoid in some taxa; the straps may be parallel and of about equal length (pl. 5), although in about half of the known species this is not the case. The dorsal margin of the posterior process of the left paramere is usually undulating, although this attribute is not obvious in all species and also occurs in some species of other genera, e.g., *Eremotylus* and *Omnivoriphylus*. The dark coloration of antennal segment 1 and part of segment 2 sets *B. agnew* and *B. cassisi* apart from all other *Bifidostylus* spp. These aspects of variation in structure and coloration make *Bifidostylus* among the most heterogeneous of the genera we recognize. On the other hand, none of the species show any spotting on the femora, nor do any of them have the dark spot on the corium at the inner angle of the cuneus and at the apex of the membrane cells, features that are found in many other genera.

Bifidostylus agnew, new species
Figure 9, map 4, table 1, plates 4, 5

Diagnosis: Recognized by the elongate, parallel-sided body form, black antennal segment 1 and proximal portion of segment 2, calli demarcated by darkening of the pronotum, infuscate membrane (pl. 4), and the slender, strongly curving endosoma with an almost medially placed gonopore and a single, very long, slender, apical spine (fig. 9, pl. 5). Most similar to *B. cassisi* on the basis of the elongate body form and dark antennal segment 1, but that species with a distinctly reddish cuneus and endosoma with secondary gonopore placed much nearer to apex and (therefore) with much shorter apical spines.

Description: *Male*: Elongate, parallel sided, mean total length 4.34, mean pronotum width 1.03. COLORATION (pl. 4): General coloration dirty yellow (in preserved specimens), legs with strong reddish tinge; antennal segment 1 black except for white apical ring, segment 2 black proximally and dirty reddish over remainder of length, segments 3 and 4 infuscate. Calli demarcated with black along posterior margin. Hemelytron with longitudinal infuscation along claval suture and most of clavus; membrane strongly infuscate. SURFACE AND VESTITURE (pl. 4): Dull to very weakly shining, appearing weakly granular; dorsum with reclining, short, dark, simple setae. STRUCTURE: **Head** (pl. 4): Eyes globular; vertex relatively narrow, bulging and weakly projecting anterior to eye; eye occupying two-thirds height of head; antenna inserted somewhat above ventral margin of eye, eye not emarginate; antennal segment 2 long (1.14), 1.6 times width of head; labium reaching posterior margin of mesosternum. **Thorax** (pl. 4): Anterior margin of pronotum sinuous, lateral margin weakly concave, posterior margin nearly straight, posterior lobe only weakly elevated; calli distinct, although not conspicuously elevated; mesoscutum partially exposed; scutellum nearly flat. *Hemelytron* (pl. 4): Costal margin nearly straight; cuneus elongate triangular. GENITALIA (fig. 9, pl. 5): **Pygophore:** Broadly conical.

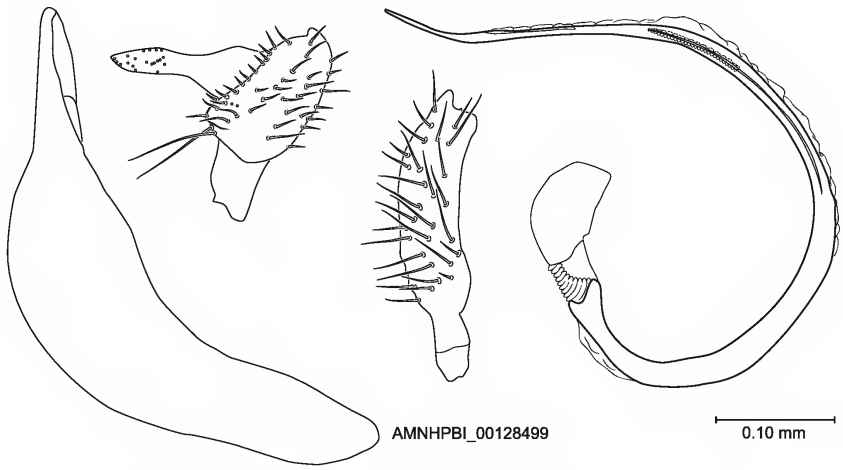


Fig. 9. Male genitalic structures of *Bifidostylus agnew*

Endosoma: J-shaped, slender, recurved to right side in dorsal view; dorsal and ventral straps contiguous for entire length of endosoma, ventral strap minutely bifid subapically and with length subequal to ventral strap; secondary gonopore long, narrow, medially situated; length of endosoma distad of secondary gonopore approximately 3× length of gonopore. **Phallotheca:** Apical portion narrowly conical, aperture elongate ovoid, situated on dorsal surface; basal portion long, reaching anterior margin of pygophore in situ. **Parameres:** Left paramere with dorsoposterior margin elevated above anterior and posterior processes; posterior process moderately long, slightly undulating, base slightly expanded; anterior process short, slightly projecting, long seta situated ventrad of anterior process. Right paramere elongate, slightly curved anteriorly, apex with two coplanar points, posterior point longer than anterior point.

Female (pl. 4): Very elongate elliptical, costal margin of hemelytron weakly convex; total length, pronotum width. Coloration, surface, and vestiture as in male. Frons inflated and distinctly projecting anterior to eye.

Etymology: Named for the Western Australian town of Agnew, which is near the type locality; a noun in apposition.

Host: Recorded from *Eremophila spuria* (pl. 39B).

Distribution (map 4): Known only from the type locality in the Goldfields region of Western Australia.

Discussion: As is also the case in *Bifidostylus cassisi*, this species stands out among the majority of Australian cremnorrhinines for the nearly black antennal segment 1, a feature occurring elsewhere only some species of *Dicyphylus* and *Proteophylus*, and the reddish coloration of parts of the dorsum.

Holotype: **AUSTRALIA: Western Australia:** 80.2 km W of Agnew toward Sandstone, 28.00117°S 119.9593°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Eremophila spuria* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05056160, 1♂ (AMNH_PBI 0013 4829) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 80.2 km W of Agnew toward Sandstone, 28.00117°S 119.9593°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Eremophila spuria* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05056160, 1♂ (00389123), 7♀ (00389125–00389130, 00087208) (AM), 5♂ (00134832, 00099383, 00391052, 00128499, 00134831), 13♀ (00134833–00134843, 00134847, 00134848) (AMNH), 2♂ (00134828, 00134830), 3♀ (00134844–00134846) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 80.2 km W of Agnew toward Sandstone, 28.00117°S 119.9593°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Eremophila spuria* Chinnock (Scrophulariaceae), det. PERTH staff

PERTH 05056160, 1 adult sex unknown (00389124) (AM).

Bifidostylus cassisi, new species
Figure 10, map 4, table 1, plates 4, 5

DIAGNOSIS: Recognized by the elongate, parallel-sided body form, black antennal segment 1 and proximal portion of segment 2, calli demarcated by darkening of the pronotum, weakly infuscate membrane (pl. 4), and the slender, and strongly curving endosoma with subapical gonopore and apical spines about the length of gonopore (fig. 10, pl. 5). Most similar to *B. agnew* in the elongate body form and the dark antennal segment 1, but with a distinctly reddish cuneus and endosoma with subapical secondary gonopore and shorter apical spines; in *B. agnew* cuneus pale, secondary gonopore near midpoint of endosoma, and apical spine very long (fig. 9).

DESCRIPTION: *MALE*: Elongate, parallel sided, mean total length 3.55, mean pronotum width 0.87. COLORATION (pl. 4): Background coloration pale; posterior lobe of pronotum reddish with pale longitudinal midline; calli black; mesoscutum red, scutellum reddish laterally with pale midline; hemelytron with longitudinal dirty red markings on endocorium and clavus, cuneus more obviously red except for pale base; femora strongly dirty red; antennal segment 1 black except for white apical ring, segment 2 black proximally and dirty reddish over remainder of length, segments 3 and 4 infuscate; membrane moderately infuscate. SURFACE AND VESTITURE (pl. 4): Dull to very weakly shining, appearing weakly granular; dorsum with reclining, short, dark, simple setae. STRUCTURE: **Head** (pl. 4): Eyes globular, vertex somewhat broad; vertex bulging and somewhat projecting anterior to eye; eye occupying two-thirds of height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate; antennal segment 2 long (1.07), 1.57 times width of head; labium reaching apex of mesocoxa. **Thorax** (pl. 4): Anterior margin of pronotum sinuous, lateral margin weakly concave, posterior margin nearly straight, posterior lobe nearly flat; calli distinct, although not conspicuously elevated; mesoscutum partially exposed; scutellum nearly flat. *Hemelytron*: Corial margin nearly straight; cuneus elongate triangular. GENITALIA (fig. 10, pl. 5): **Pygophore:** Broadly conical; minute medial tubercle anteriad of aperture. **Endosoma:** J-shaped, slender, recurved to right side in dorsal view; dorsal and ventral straps practically contiguous over entire length of endosoma, ventral strap entire distally and slightly longer than dorsal strap; secondary gonopore moderately long, narrow, subapical; endosoma distad of secondary gonopore approximately equal to length of gonopore. **Phallotheca:** Apical portion narrowly conical, aperture elongate ovoid, situated on dorsal surface; basal portion long, reaching beyond anterior margin of pygophore in situ. **Parameres:** Left paramere with dorsoposterior margin elevated above anterior and posterior processes; posterior process moderately long, slightly undulating, base slightly expanded; anterior process short, long seta situated ventrad of process. Right paramere elongate, apex with two coplanar points, posterior point longer than anterior point.

FEMALE (pl. 4): Elongate elliptical, costal margin of hemelytron weakly convex; mean total length, 3.31, mean pronotum width 0.92. Coloration, surface, and vestiture as in male. Frons strongly inflated and projecting well beyond anterior margin of eye.

ETYMOLOGY: Named for Gerasimos Cassis, in recognition of his contributions to our knowledge of the Australian Cremnorrhinina.

HOSTS: Recorded from *Eremophila freelingii* (pl. 37H, I), *E. gilesi*, and *E. glabra* (Scrophulariaceae).

DISTRIBUTION (map 4): Known from southwestern Queensland, Central Australia, and the Norseman region of Western Australia.

DISCUSSION: See discussion under *B. agnew*.

HOLOTYPE: **AUSTRALIA: Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427507, 1♂ (AMNH_PBI 00130527) (QM).

PARATYPES: **AUSTRALIA: Northern Territory:** 71.6 km NE of Kings Canyon Resort,

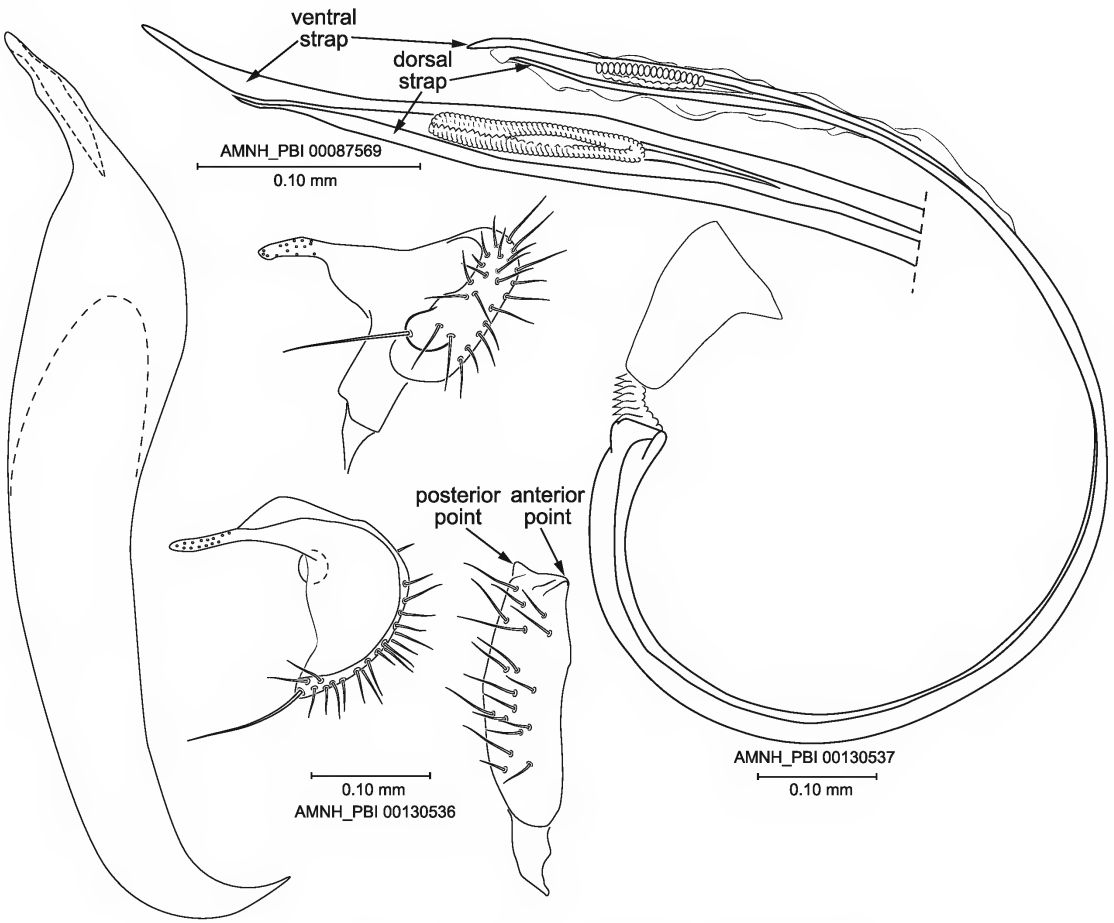


Fig. 10. Male genitalic structures of *Bifidostylus cassisi*

23.80002°S 131.6635°E, 743 m, 03 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila gilesii* F. Muell. (Scrophulariaceae), det. NSW staff NSW666317, 1♀ (00389904) (AM). 184 km W of Stuart Hiway on Lasseter Hiway, 25.24417°S 131.57028°E, 510 m, 31 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila gilesii* F. Muell. (Scrophulariaceae), det. NSW staff NSW666275, 1♂ (00413019) (AM), 5♀ (00097969–00097972, 00097146), 2♂ (00097145, 00413026) (AMNH). **Queensland:** 10.8 km NW of Charleville, 26.44062°S 146.1584°E, 360 m, 01 Nov 1998, Schuh, Cassis, Silveira, *Eremophila glabra* (R. Br.) Ostenf. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427509, 2♂ (00388664, 00388665), 3♀ (00388667–00388669) (AM). 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, host unknown, 5♂ (00389573, 00389911–00389914), 5♀ (00389574, 00389915–00389918) *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427507, 28♀ (00087269, 00389693–00389718, 00389720), 26♂ (00087270, 00389664–00389669, 00389671–00389673, 00389675–00389686, 00389688–00389690, 00389692) (AM), 39♂ (00087490, 00087569, 00130275–00130292, 00130521–00130526, 00130528–00130537, 00131421, 00131422, 00413016), 38♀ (00130301–00130308, 00130364–00130371, 00130540, 00130541, 00130544, 00130547, 00130548, 00130550, 00130551, 00131423–00131426, 00413017, 00413018, 00130373) (AMNH), 2♂ (00130293, 00130294), 2♀ (00130372, 00130373) (ANIC), 2♂ (00130299, 00130300), 2♀ (00389721, 00389722) (CNC), 5♀ (00130542, 00130543, 00130545, 00130546, 00130549), 4♂ (00389670, 00389674, 00389687, 00389691) (QM), 2♂ (00130295, 00130296), 2♀ (00130374, 00130375) (USNM), 2♂ (00130297,

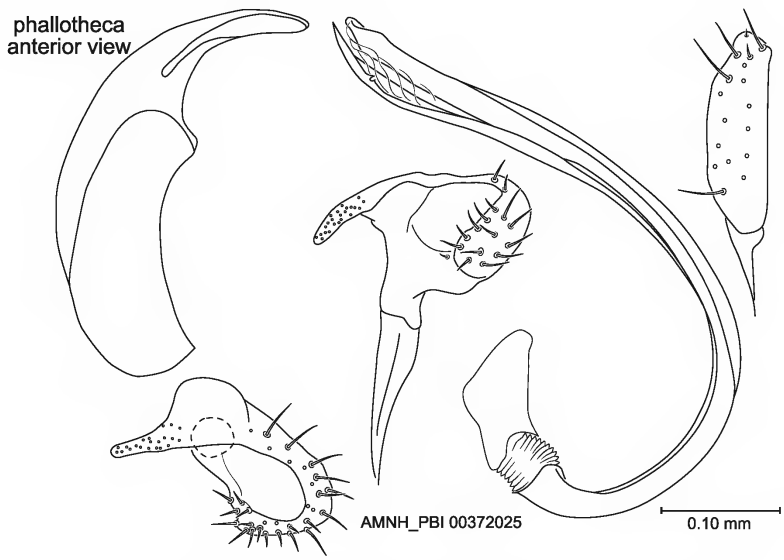


Fig. 11. Male genitalic structures of *Bifidostylus finalis*.

00130298), 1♀ (00389719) (ZISP). 16 km W of Adavale, 25.9545°S 144.7206°E, 380 m, 01 Nov 1998, Schuh, Cassis, Silveira, 3♂ (00389905–00389907), 4♀ (00389908–00389910, 00389903) (AM). **Western Australia:** 81 km E of Norseman, 32.07347°S 122.6166°E, 600 m, 23 Oct 1996, Schuh and Cassis, 1♂ (00414411) (AMNH).

Other Specimens Examined: **AUSTRALIA: Queensland:** 10.8 km NW of Charleville, 26.440626S 146.15846E, 360 m, 01 Nov 1998, Schuh, Cassis, Silveira, Eremophila glabra (R. Br.) Ostenf. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427509, 1 nymph (00388666) (AM). 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427507, 3 nymphs (00412259, 00130538, 00130539) (AMNH).

Bifidostylus finalis, new species
Figure 11, map 4, table 1, plates 4, 5

Diagnosis: Recognized by the moderate size (total length male 3.58), green-yellow coloration, almost transparent hemelytron (pl. 4), and the J-shaped endosoma without an obvious sclerotized secondary gonopore and apically straight straps of unequal diameter and equal length (fig. 11, pl. 5). Endosomal structure most similar to that of *B. gawlerensis* and *B. newmanensis* in being J-shaped and with equal-length straps. Distinguished from both of those species by their more opaque hemelytron and black setae on the dorsum and from *B. gawlerensis* by its wavy, strongly bifid dorsal endosomal strap (fig. 11).

Description: *Male*: Moderately elongate with weakly rounded lateral margins; total length 3.58, pronotum width 0.93. COLORATION (pl. 4): Green-yellow, including appendages, hemelytron almost transparent, membrane very slightly infuscate with an elongate dark streak at apex of cells. SURFACE AND VESTITURE (pl. 4): Body surface smooth, polished, and weakly shining; dorsum clothed with reclining, moderately long, dark, simple setae. STRUCTURE: **Head** (pl. 4): Eyes globular, contiguous with pronotum, vertex moderately broad, frons somewhat swollen and slightly protruding beyond anterior margin of eye; eye occupying slightly more than two-thirds height of head; antenna inserted at just above ventral margin of eye, eye slightly emarginate; antennal segment 2 moderately long (0.94), 1.45 times width of head; labium reaching to base of mesocoxa. **Thorax** (pl. 4): Pronotum with margin sinuous, depressed, calli indistinct; posterior lobe weakly elevated. Mesoscutum

rather broadly exposed; scutellum flat, triangular. *Hemelytron*: Corium not noticeably elongate, cuneus more strongly so, elongate triangular. GENITALIA (fig. 11, pl. 5): **Pygophore:** Broadly conical. **Endosoma:** J-shaped, slender, recurved to left side in dorsal view; dorsal and ventral straps contiguous except subapically, with subequal length; dorsal strap of equal thickness throughout; ventral strap narrowed apically; without secondary gonopore in membranous interstrap region. **Phallotheca:** Apical region conical, aperture gradually widening apically, situated on dorsal surface; basal region with length equal to exposed apical portion, reaching to middle of pygophore in situ. **Parameres:** Left paramere with dorsoposterior margin not elevated dorsad of anterior and posterior processes; posterior process short, straight, and deflected; anterior process short and slightly projecting, long seta not observed. Right paramere relatively short, apex broad, posterior prominence larger than anterior.

Female: Unknown.

Etymology: From the Latin, *finalis*, "pertaining to the end," in reference to this being the last species we recognized in collections of Australian Cremnorrhinina.

Host: Recorded from *Eremophila ionantha* (pl. 38C–E) (Scrophulariaceae).

Distribution (map 4): Known only from the type locality in Western Australia east of Norseman on the Eyre Highway.

Holotype: **AUSTRALIA: Western Australia:** 115.4 km E of Norseman, 32.05143°S 122.9675°E, 600 m, 23 Oct 1996, Schuh and Cassis, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05056152, 1♂ (AMNH_PBI 00372025) (WAMP).

Bifidostylus gawlerensis, new species
Figure 12, map 4, table 1, plates 4, 5

Diagnosis: Recognized by the relatively large size (total length male 4.28), green coloration, translucent hemelytron, black setae on dorsum (pl. 4), and J-shaped endosoma with weakly sclerotized subapical secondary gonopore and wavy straps of nearly equal length (fig. 12, pl. 5). Endosomal structure most similar to that of *B. finalis* and *B. newmanensis* in being J-shaped and with equal length straps. Distinguished from *B. finalis* by the almost transparent hemelytron, weakly darkened setae, and apically straight endosomal straps in that species; shares with *B. newmanensis* green coloration, translucent hemelytron, black setae on the dorsum, and large eyes, but differing by *B. newmanensis* having distally straight endosomal straps.

Description: *Male*: Total length 4.28, pronotum width 1.23. COLORATION (pl. 4): Pale green; membrane weakly fumose. SURFACE AND VESTITURE (pl. 4): Dorsum weakly polished and shining, weakly crenulate, covered with recumbent, black, simple setae. STRUCTURE: **Head** (pl. 4): Eyes large, protuberant, vertex relatively narrow; frons not inflated, not surpassing anterior margin of eye; eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye moderately emarginate; antennal segment 2 long (1.45), 1.60 times width of head; labium not quite reaching posterior margin of mesosternum. **Thorax** (pl. 4): Pronotum with anterior lobe demarcated, calli distinct laterally, posterior lobe flat to very weakly elevated, lateral and posterior margins nearly straight; mesoscutum rather broadly exposed. *Hemelytron*: Not obviously elongate, corial margin nearly straight, cuneus short, broadly triangular, lateral margin rounded. GENITALIA (fig. 12, pl. 5): **Pygophore:** Broadly conical. **Endosoma:** J-shaped, dorsal and ventral straps undulating, appearing intertwined, contiguous basally and subapically, separated medially; ventral strap sinuous, of equal thickness throughout, except attenuate apically; dorsal strap sinuous, strongly bifid subapically; interstrap membranous region billowy with secondary gonopore faintly sclerotized, with incomplete ring and long thin basal sclerite. **Phallotheca:** Apical portion pitcher shaped, broad subapically, aperture broadly ovoid, situated on dorsal surface; basal portion with relatively long, practically reaching anterior margin of pygophore in situ. **Parameres:** Left paramere with dorsoposterior margin slightly elevated above anterior and posterior processes; posterior process relatively long, straight, with undulating ventral surface; anterior process short, produced, long seta not observed. Right paramere lost during dissection.

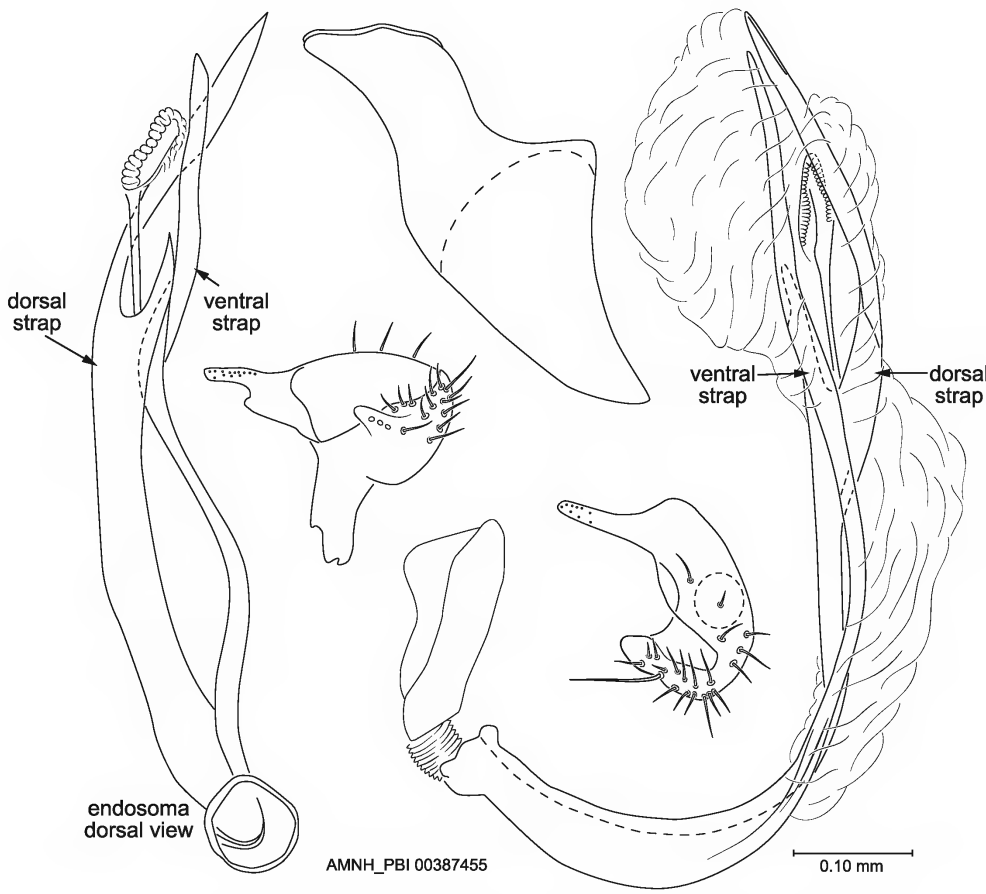


Fig. 12. Male genitalic structures of *Bifidostylus gawlerensis*.

Female (pl. 4): Elongate ovoid, costal margin of hemelytron weakly convex; total length 3.94, pronotum width 1.19. Coloration, surface, and vestiture similar to male. Eyes much smaller than in male, vertex broad; frons modestly inflated and slightly projecting beyond anterior margin of eye.

Etymology: Named for the Gawler Ranges in South Australia, locality for all known specimens.

Host: Recorded from *Myoporum platycarpum* (pl. 39F) (Scrophulariaceae).

Distribution (map 4): Known only from the Gawler Ranges in South Australia.

Discussion: The body, and particularly the pronotum, appear distinctly flattened in the only known female specimen of this taxon.

Holotype: **AUSTRALIA: South Australia:** Gawler Ranges National Park: ca. 3.7 km S of Pine Well, 32.37141°S 135.29219°E, 186 m, 16 Nov 2012, M. Cheng, G.S. Taylor, R. Kittel & D. McLaughlin, *Myoporum platycarpum* R. Br. *platycarpum* (Scrophulariaceae), det. SA Herbarium BS838-902, 1♂ (AMNH_PBI 00387455) (SAMA).

Paratypes: **AUSTRALIA: South Australia:** Hiltaba: ca. 1 km N of the southern boundary, on Gawler Ranges Road, 32.17327°S 135.05894°E, 126 m, 12 Nov 2012, M. Cheng & G.S. Taylor, *Myoporum platycarpum* R. Br. *platycarpum* (Scrophulariaceae), det. SA Herbarium BS838-902, 1♀ (00387456) (UNSW).

Bifidostylus gilesi, new species
Figure 13, map 4, table 1, plates 4, 5

Diagnosis: Recognized by the modest size, elongate, parallel-sided body form, bulging

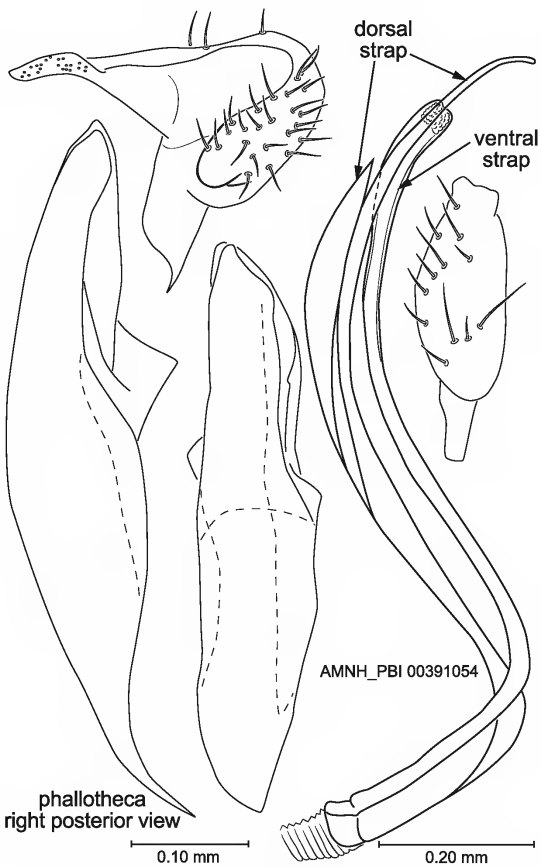


Fig. 13. Male genitalic structures of *Bifidostylus gilesi*.

eyes, greenish coloration, and black vestiture on dorsum (pl. 4); long endosoma sigmoid with portion of one strap broad and terminating well before small secondary gonopore, the other portion apically elongate, slender, well surpassing gonopore; left paramere with sinuous dorsal margin of posterior process; right paramere with conspicuously bifid apex (fig. 13, pl. 5). Female with smaller eyes and broader vertex than male (pl. 4). Apical endosomal spines distinctive among species we place in *Bifidostylus*, but structure of parameres and other aspects of endosoma concordant; uniform green coloration as in many *Bifidostylus* species. Similar to *B. omnivorus* and *B. silveirae* in size, shape, and the possession of large eyes, but separated from those species by the form of its slender, apical endosomal spine and its more conspicuous black vestiture.

DESCRIPTION: *MALE*: Relatively small, parallel sided, mean total length 3.06, mean pronotum width 0.85. COLORATION (pl. 4): Pale green; membrane fumose. SURFACE AND VESTITURE (pl. 4): Dorsum smooth, weakly polished and shining; dorsal vestiture of reclining, black, simple setae. STRUCTURE: **Head** (pl. 4): Eyes large, protuberant; vertex broad; frons weakly swollen and slightly projecting beyond anterior margin of eye; eye occupying four-fifths height of head; antenna inserted just below midpoint of eye, eye weakly emarginate; antennal segment 2 long (0.98), 1.42 times width of head; labium not quite reaching posterior margin of mesosternum. **Thorax** (pl. 4): Pronotum with posterior lobe weakly elevated, lateral and posterior margins straight; calli weakly elevated, demarcated along posterior margin; mesoscutum moderately exposed. *Hemelytron*: Corial margin straight; cuneus short, broadly triangular. GENITALIA (fig. 13, pl. 5): **Pygophore:** Broadly conical. **Endosoma:** Large, sigmoid, distal one-half curved to left, dorsal and ventral straps contiguous and parallel up to level of secondary gonopore; ventral strap entire, terminating at secondary gonopore; dorsal strap strongly bifid just distad of middle of endosoma, forming subequal length spines; shorter spine broad and angled laterad to body of endosoma, not reaching level of secondary gonopore, longer spine, narrow needlelike, extending beyond gonopore; secondary gonopore small, well sclerotized, situated within fold at apex of dorsal strap. **Phallotheca:** Apical region elongate, somewhat broadened, narrowed apically, aperture elongate-triangular with strongly sclerotized margins, basal portion long, reaching anterior margin of pygophore. **Parameres:** Left paramere with dorsoposterior margin prominently elevated above anterior and posterior processes; posterior process long, undulating in lateral view and sinuous in dorsal view; anterior process short, produced, long seta present ventrad of lobe. Right paramere somewhat fusiform with well-defined bifid apex.

FEMALE (pl. 4): Elongate ovoid, mean total length 3.03, mean pronotum width 0.89. Coloration and vestiture as in male. Eyes smaller and vertex somewhat wider than in male.

ETYMOLOGY: Named for Ernest Giles, central Australian pioneer, and the places named after him.

HOST: Recorded only from *Eremophila sturtii* (pl. 39C–E) (Scrophulariaceae).

DISTRIBUTION (map 4): Known from the Alice Springs region of Central Australia.

DISCUSSION: The bifurcate distal portion of the dorsal endosomal strap is documented by us as a diverging lateral spine (pl. 5) or it adheres to the other distal spines (fig. 13), perhaps indicating that this sclerite expands during copulation.

HOLOTYPE: **AUSTRALIA: Northern Territory:**~44 km W of Stuart Hiway on Ernest Giles Rd, 24.56668°S 132.6815°E, 494 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666246, 1♂ (AMNH_PBI 00098439) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 3.6 km NW of Henbury Homestead, 1.5 km W from Stuart highway towards 3 Mile Creek, 24.52583°S 133.23306°E, 431 m, 16 May 2013, M. Cheng, C. Bayer & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 4♂ (00414054, 00414055, 00414057, 00414060), 2♀ (00414072, 00414079) (AMNH), 4♀ (00414076–00414078, 00414080) (MNT), 14♀ (00387435, 00387439, 00414063–00414071, 00414073–00414075), 11♂ (00387436, 00387437, 00414050–00414053, 00414056, 00414058, 00414059, 00414061, 00414062) (UNSW). 11.5 km NE of Henbury Homestead, 24.46528°S 133.31694°E, 441 m, 16 May 2013, M. Cheng, C. Bayer & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♀ (00387433) (AMNH), 3♂ (00387431, 00387432, 00414089), 3♀ (00387438, 00414090, 00414091) (UNSW). 22 mi S of Alice Springs, 24.3°S 134.6°E, 15 Feb 1966, J.A. Grant, 1♂ (00174098) (BMNH). 51.6 km W of Stuart Hiway on Mount Denison–Coniston Rd, 22.30001°S 132.8951°E, 722 m, 24 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW658334, 2♂ (00097463, 00097464), 2♀ (00097465, 00097466) (AMNH). Coniston, 18 Feb 1966, J.A. Grant, 6♂ (00174090–00174095), 2♀ (00174096, 00174097) (BMNH). Henbury Station, 14 km NE from Henbury Homestead, North of Chandler Range approx 2.3 km from Stuart Highway, 24.46556°S 133.35194°E, 549 m, 17 May 2013, M. Cheng & C. Duykers, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♀ (00387440) (AMNH), 3♂ (00414083–00414085), 3♀ (00414086–00414088) (UNSW). ~44 km W of Stuart Hiway on Ernest Giles Rd, 24.56668°S 132.6815°E, 494 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666246, 9♀ (00098440–00098447, 00097160), 2♂ (00097159, 00391054) (AMNH).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Northern Territory:** 3.6 km NW of Henbury Homestead, 1.5 km W from Stuart highway towards 3 Mile Creek, 24.52583°S 133.23306°E, 431 m, 16 May 2013, M. Cheng, C. Bayer & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 2 nymphs (00414081, 00414082) (UNSW). 11.5 km NE of Henbury Homestead, 24.46528°S 133.31694°E, 441 m, 16 May 2013, M. Cheng, C. Bayer & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 2 nymphs (00414092, 00414093) (UNSW).

Bifidostylus kalgoorlie, new species
Figure 14, map 5, table 1, plates 4, 5

DIAGNOSIS: Recognized by the relatively large size, greatly elongate, parallel-sided body form, dark, dirty yellow-orange coloration (in available preserved specimens), and heavily fumose membrane (pl. 4); endosoma sigmoid and twisted, with large, subapical secondary gonopore, shorter strap reaching to about midpoint of gonopore, longer strap exceeding gonopore and with a fingerlike apex (fig. 14, pl. 5); left paramere with sinuous dorsal margin of posterior process; right paramere with conspicuously bifid apex (fig. 14). Sigmoid and twisted endosoma in conjunction with structure of apical spines distinctive among *Bifidostylus* spp., but structure of parameres and endosoma concordant. Female broadly ovoid, not nearly as elongate as male. Most similar in size and body shape to *B. occidentalis*, but general coloration paler in that species, including only weakly fumose membrane; endosoma twisted and sigmoid in both species, but apical endosomal spines also

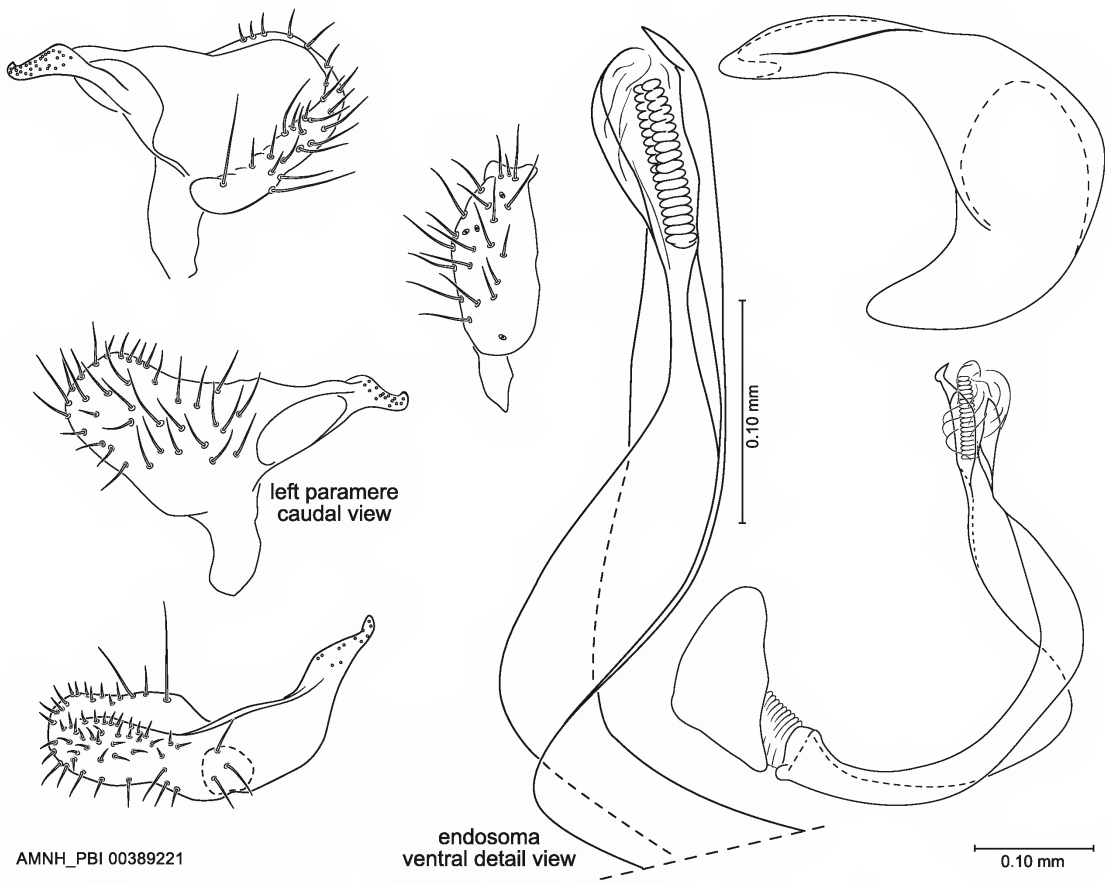


Fig. 14. Male genitalic structures of *Bifidostylus kalgoorlie*.

distinct, *B. occidentalis* with three slender spines, whereas *B. kalgoorlie* with one.

DESCRIPTION: *MALE*: Greatly elongate, parallel sided, mean total length 3.79, mean pronotum width 0.94. COLORATION (pl. 4): Dark, dirty yellow-orange; membrane heavily fumose. SURFACE AND VESTITURE (pl. 4): Dorsum smooth, weakly polished and shining; dorsum clothed with reclining, pale, simple setae. STRUCTURE: **Head** (pl. 4): Eyes not noticeably large, vertex relatively broad; frons weakly swollen, rounded, and slightly exceeding anterior margin of eye; eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate above antennal insertion; antennal segment 2 long (1.19), 1.7 times width of head; labium reaching almost to apex of metacoxa. **Thorax** (pl. 4): Pronotum with calli faintly visible, posterior lobe short, weakly elevated, lateral margin straight, posterior margin weakly excavate; mesoscutum moderately exposed. *Hemelytron*: Corium greatly elongate, lateral margin nearly straight; cuneus strongly elongate triangular. GENITALIA (fig. 14, pl. 5): **Pygophore:** Broadly conical with two narrow tubercles present midway between paramere insertions and anterior margin of pygophore, tubercle on left side larger than that on right. **Endosoma:** Sigmoid, distal one-half bent to left; dorsal and ventral straps entire, contiguous to level of secondary gonopore, somewhat twisted and broadened medially, ventral strap terminating in wide sclerite, equal to middle of secondary gonopore; dorsal strap narrowed to form bent apical spine, extending beyond gonopore; secondary gonopore well sclerotized moderately large, situated within interstrap membrane. **Phallotheca:** Apical portion

elongate conical, somewhat broadened subapically, compresses or flattened in dorsal view, aperture elongate trianglular; basal portion reaching to middle of ventral surface of pygophore in situ. **Parameres:** Left paramere relatively large with undulating dorsoposterior margin prominently elevated above anterior and posterior processes; posterior process long, undulating in lateral view and sinuous in dorsal view; anterior process minute, barely produced beyond surface of paramere, long seta present mediad of anterior process. Right paramere somewhat swollen with well-defined bifid apex.

Female (pl. 4): Broadly ovoid, mean total length 2.99, mean pronotum width 0.98. Coloration and vestiture as in male. Eyes of similar size to male, but vertex appearing somewhat wider.

Etymology: Named for the Western Australian town of Kalgoorlie, near which specimens were collected; a noun in apposition.

Host: Labeled as occurring on *Melaleuca sheathiana* (Myrtaceae) (pl. 34E). We posit that available specimens are mislabeled and should be labeled as occurring on *Eremophila parvifolia* (Scrophulariaceae), which our field data indicate was documented as a host at the same site as *M. sheathiana*.

Distribution (map 5): Known only from the type locality near Kalgoorlie in the Gold Fields region of Western Australia.

Discussion: Although labels suggest this taxon was collected on *Melaleuca*, we assert that mislabeling is involved. This taxon and *B. occidentalis* are both very similar in external appearance to *Myrtophylus* species, especially the elongate body form of the males, but the structure of the endosoma and other aspects of the male genitalia we place in that Myrtaceae-feeding group are unlike the structure seen in *B. kalgoorlie* and *B. occidentalis*.

Holotype: **AUSTRALIA: Western Australia:** 21 km E of Kalgoorlie near transcon. railroad, 30.87541°S 121.69346°E, 500 m, 23 Oct 1996, Schuh and Cassis, *Melaleuca sheathiana* W. Fitzg. (Myrtaceae), det. PERTH staff PERTH 05054583, 1♂ (AMNH_PBI 00389218) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 21 km E of Kalgoorlie near transcon. railroad, 30.87541°S 121.69346°E, 500 m, 23 Oct 1996, Schuh and Cassis, *Melaleuca sheathiana* W. Fitzg. (Myrtaceae), det. PERTH staff PERTH 05054583, 4♂ (00389215, 00389219–00389221) (AM), 2♂ (00389216, 00389217), 2♀ (00389224, 00389225) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 21 km E of Kalgoorlie near transcon. railroad, 30.87541°S 121.69346°E, 500 m, 23 Oct 1996, Schuh and Cassis, *Melaleuca sheathiana* W. Fitzg. (Myrtaceae), det. PERTH staff PERTH 05054583, 2 nymphs (00389222, 00389223) (AM).

Bifidostylus newmanensis, new species
Figure 15, map 5, table 1, plates 4, 5

Diagnosis: Recognized by the moderate size (mean total length male 3.53), green coloration, translucent hemelytron, the black setae on the dorsum (pl. 4), and the J-shaped endosoma with narrow sclerotized subapical secondary gonopore and apically straight endosomal straps (fig. 15, pl. 5). Endosomal structure most similar to that of *B. finalis* and *B. gawlerensis* in being J-shaped and with equal-length straps. Distinguished from *B. finalis* by the almost transparent hemelytron and weakly darkened setae in that species; shares with *B. gawlerensis* the green coloration, translucent hemelytron, and black setae on the dorsum, but differing from *B. gawlerensis* by that species having distally wavy endosomal straps.

Description: *Male*: Weakly elongate, parallel sided, mean total length 3.53, mean pronotum width 1.05. COLORATION (pl. 4): Pale green (yellow to orange in some preserved specimens); membrane weakly fumose. SURFACE AND VESTITURE (pl. 4): Dorsum weakly polished and shining, weakly crenulate, covered with recumbent, black, simple setae. STRUCTURE: **Head** (pl. 4): Eyes large, protuberant, vertex moderately broad; frons not inflated, slightly surpassing anterior margin of eye; eye occupying three-quarters height of head; antenna inserted somewhat above ventral margin of eye, eye slightly emarginate; antennal segment 2 relatively short (1.06), 1.17 times width of head; labium reaching to apex of procoxa. **Thorax** (pl. 4): Pronotum with anterior lobe demarcated, calli distinct, posterior lobe flat to very weakly elevated, lateral and posterior margins very weakly concave; mesoscutum moderately

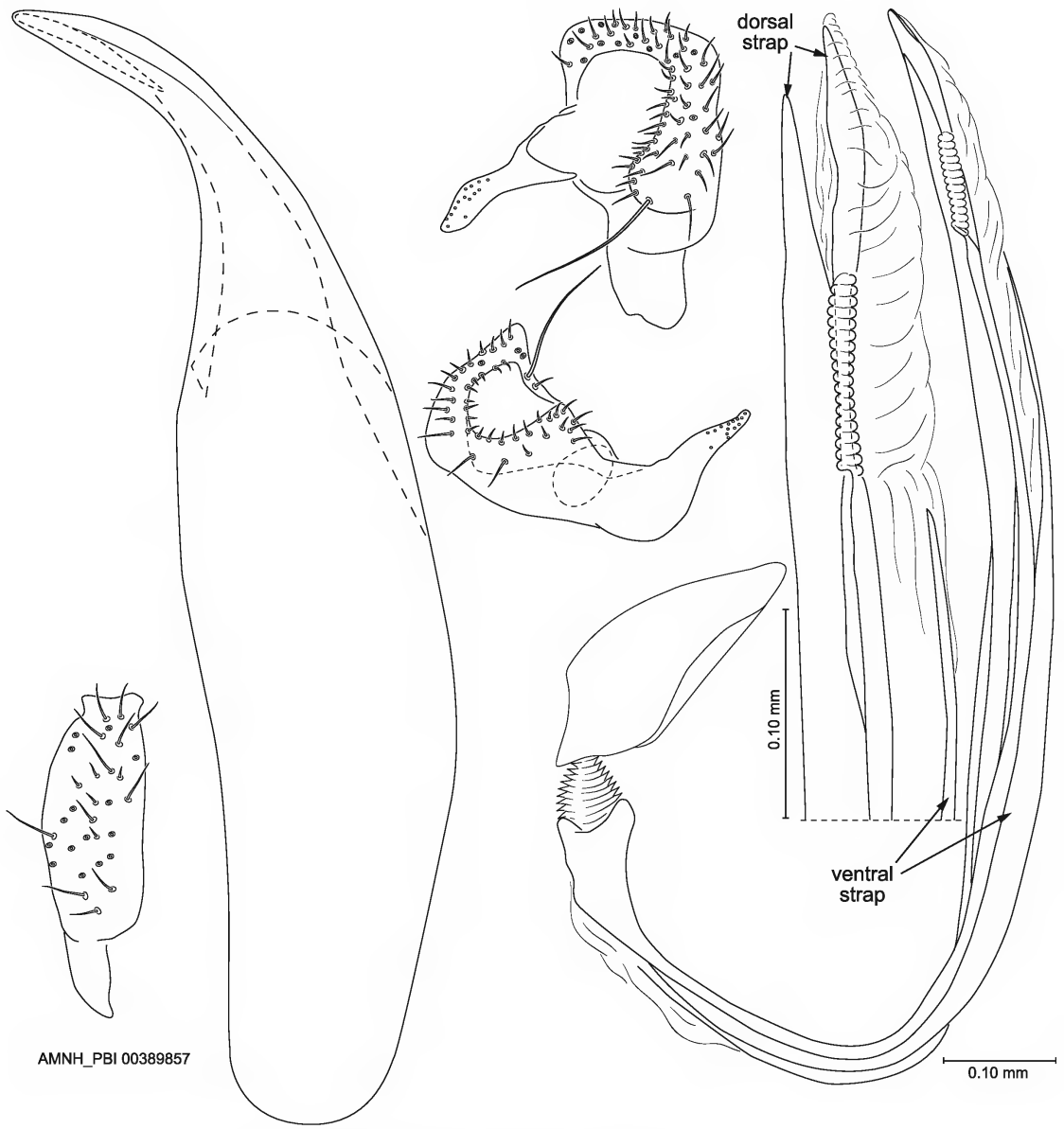


Fig. 15. Male genitalic structures of *Bifidostylus newmanensis*.

exposed. *Hemelytron*: Not obviously elongate, corial margin nearly straight, cuneus at most weakly elongate, triangular. GENITALIA (fig. 15, pl. 5): **Pygophore:** Elongate conical. **Endosoma:** J-shaped, straps contiguous and parallel, dorsal strap bifid subapically with two narrow, equally thick spines of subequal length extending beyond secondary gonopore by length of gonopore; ventral strap bifid medially, terminating proximad of secondary gonopore, shorter and thinner than dorsal strap, narrow and of equal thickness throughout, except attenuate apically; interstrap membranous region narrow; secondary gonopore narrow, well sclerotized. **Phallotheca:** Apical portion elongate conical, somewhat broadened subapically, compressed or flattened in dorsal view, aperture elongate triangular; basal portion long, reaching beyond anterior margin of pygophore in situ.

Parameres: Left paramere with dorsoposterior margin strongly elevated above anterior and posterior processes with broad dorsal protuberance; posterior process long, undulating in lateral view and sinuous in dorsal view; anterior process small, slightly produced beyond surface of paramere, long seta present ventrad of anterior process. Right paramere somewhat swollen with well-defined bifid apex.

Female (pl. 4): Elongate elliptical, costal margin of hemelytron weakly convex; mean total length 3.32, mean pronotum width 1.00. Coloration, surface, and vestiture similar to male. Eyes much smaller than in male, vertex broad; frons modestly inflated and slightly projecting beyond anterior margin of eye.

Etymology: Named for the the type locality in Western Australian, Newman Rocks.

Host: Recorded from *Eremophila alternifolia* (Scrophulariaceae).

Distribution (map 5): Known only from the type locality, Newman Rocks, east of Norseman, Western Australia, on the Eyre Highway.

Holotype: **AUSTRALIA: Western Australia:** Newman Rocks, 136.5 km E of Norseman, 32.11084°S 123.1704°E, 250 m, 22 Oct 1996, Schuh and Cassis, 1♂ (AMNH_PBI 00389857) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Newman Rocks, 136.5 km E of Norseman, 32.11084°S 123.1704°E, 250 m, 22 Oct 1996, Schuh and Cassis, *Eremophila alternifolia* R.Br. (Scrophulariaceae), det. PERTH staff PERTH 05095069, 1♂ (00128759), 2♀ (00389858, 00389859) (AM), 1♂ (00413024) (AMNH), 1♂ (00128760), 1♀ (00128762) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** Newman R other other ocks, 136.5 km E of Norseman, 32.11084°S 123.1704°E, 250 m, 22 Oct 1996, Schuh and Cassis, *Eremophila alternifolia* R.Br. (Scrophulariaceae), det. PERTH staff PERTH 05095069, 2 nymphs (00389860, 00389861) (AM).

Bifidostylus occidentalis, new species
Figure 16, map 5, table 1, plates 4, 5, 42C, E, F

Diagnosis: Recognized by the relatively large size, greatly elongate, parallel-sided body form, pale yellow-green coloration (in available preserved specimens), and weakly fumose membrane (pl. 4); endosoma sigmoid and twisted, with subapical secondary gonopore surrounded by three slender apical spines and a membrane, longest spine slender, acuminate and exceeding secondary gonopore by about length of gonopore (fig. 16, pl. 5); left paramere with sinuous dorsoposterior margin; right paramere with conspicuously bifid apex (fig. 16). Female broadly ovoid, not as elongate and slender as in male. Sigmoid and twisted endosoma, in conjunction with structure of apical spines, distinctive among *Bifidostylus* spp., but structure of parameres and endosoma concordant. Most similar in size and body shape to *B. kalgoorlie*, but general coloration darker in that species, including the heavily fumose membrane; endosoma twisted and sigmoid in both species, but apical endosomal spines also distinct, *B. occidentalis* having three slender spines, whereas *B. kalgoorlie* with one.

Description: *Male*: Greatly elongate, parallel sided, mean total length 4.85, mean pronotum width 1.14. COLORATION (pl. 4): Pale yellow-orange; membrane weakly fumose. SURFACE AND VESTITURE (pl. 4): Dorsum smooth, weakly polished and shining; dorsum clothed with reclining, pale, simple setae. STRUCTURE: **Head** (pl. 4): Eyes moderately large, vertex relatively broad; frons weakly swollen, rounded, and slightly exceeding anterior margin of eye; eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, moderately emarginate; antennal segment 2 long (1.40), 1.5 times width of head; labium just surpassing posterior margin of mesosternum. **Thorax** (pl. 4): Pronotum with calli faintly visible, posterior lobe weakly elevated, lateral and posterior margins straight; mesoscutum narrowly exposed. *Hemelytron*: Corium greatly elongate, lateral margin nearly straight; cuneus strongly elongate triangular. GENITALIA (fig. 16, pl. 5): **Pygophore:** Triangular. **Endosoma:** Sigmoid, straps contiguous to just distad of midpoint, ventral strap narrow, bending laterad medially, terminating as thin spine at level of secondary gonopore; dorsal strap bifid with two narrow undulating sections terminating as diverging spines exceeding gonopore; narrow well-sclerotized secondary gonopore subapical, situated

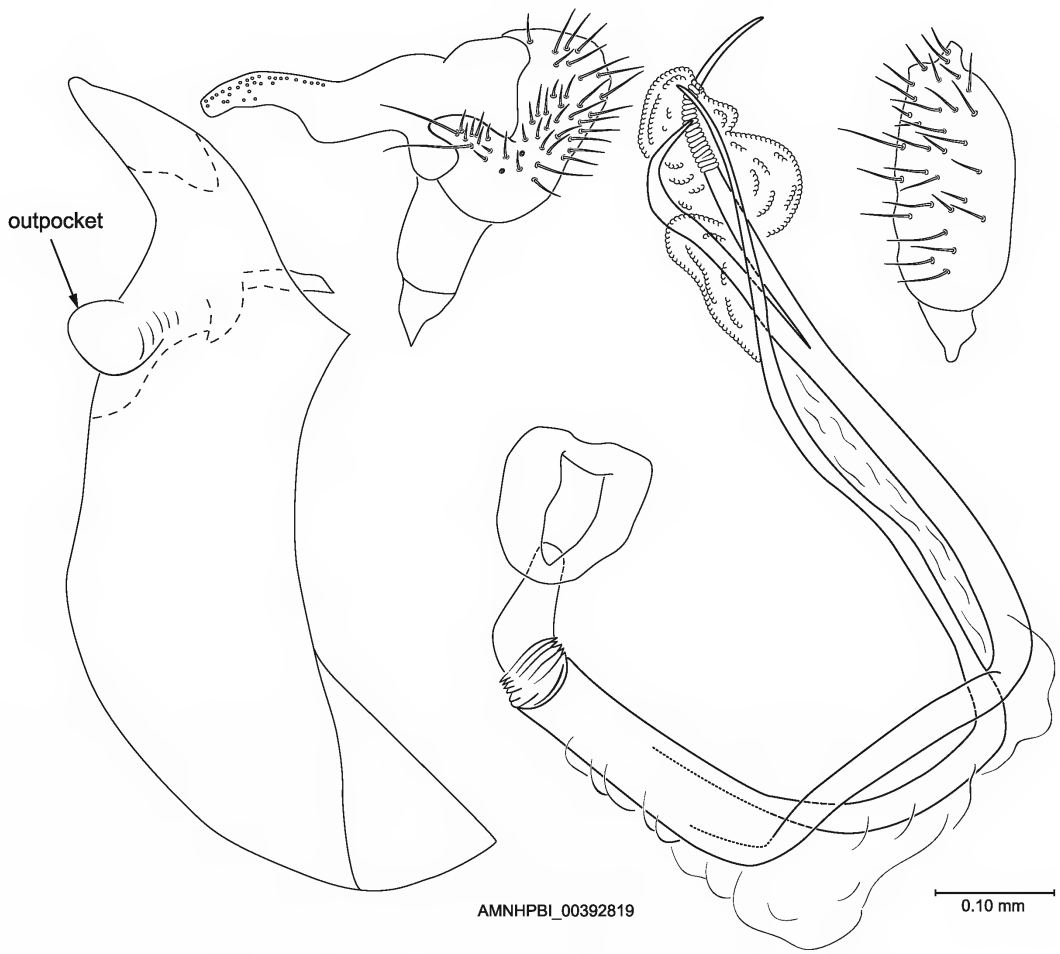


Fig. 16. Male genitalic structures of *Bifidostylus occidentalis*.

within billowy interstrap membrane. **Phallotheca:** Apical portion elongate conical, somewhat broadened subapically, aperture ovoid, situated on anterior surface, right side of base with large sclerotized outpocket; basal portion reaching to middle of ventral surface of pygophore in situ. **Parameres:** Left paramere with dorsoposterior margin strongly elevated above anterior and posterior processes; posterior process long, undulating in lateral view and sinuous in dorsal view; anterior process relatively large, long seta present laterad of process. Right paramere somewhat swollen with one well-defined apical process and small posterior angle.

Female (pl. 4): Very elongate ovoid, mean total length 4.35, mean pronotum width 1.18. Coloration and vestiture as in male. Eyes of similar size to male but vertex appearing somewhat wider. GENITALIA as in plate 42C, E, F.

Etymology: From the Latin, *occidentalis*, "of the west," referring to the occurrence of this species in Western Australia.

Host: Recorded from *Eremophila ionantha* (pl. 38C–E) (Scrophulariaceae).

Distribution (map 5): Most known specimens collected at the type locality near Peak Charles National Park, Western Australia, southwest of Norseman, with additional material known from 115 km E of Norseman, also on *Eremophila ionantha*.

Discussion: See also discussion under *B. kalgoorlie*. This is the only species we place in *Bifidostylus* with the right paramere lacking the bifid apex. We nonetheless maintain this

placement because other features—such as the structure of the endosoma, phallotheca, and left paramere—largely agree with those in most of the remaining species we place in the genus.

HOLOTYPE: **AUSTRALIA: Western Australia:** 4.3 km N of Peak Charles National Park, 32.81408°S 121.2114°E, 200 m, 20 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05670438, 1♂ (AMNH_PBI 00129839) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 4.3 km N of Peak Charles National Park, 32.81408°S 121.2114°E, 200 m, 20 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05670438, 20♂ (00087461, 00413381–00413399), 50♀ (00413409–00413441, 00413450–00413461, 00413917–00413921) (AM), 6♂ (00129837, 00129838, 00099400, 00413400–00413402), 17♀ (00129840–00129850, 00099401, 00129851, 00129852, 00413442–00413444) (AMNH), 5♂ (00413403–00413407), 5♀ (00413445–00413449) (WAMP). 115.4 km E of Norseman, 32.05143°S 122.9675°E, 600 m, 23 Oct 1996, Schuh and Cassis, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05056152, 4♂ (00388861–00388864), 1♀ (00388865) (AM), 1♂ (00392819) (AMNH).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** 4.3 km N of Peak Charles National Park, 32.81408°S 121.2114°E, 200 m, 20 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05670438, 4 nymphs (00413922–00413925) (AM).

Bifidostylus omnivorus, new species
Figure 17, map 5, table 1, plates 4, 5

DIAGNOSIS: Recognized by the moderate size, elongate, parallel-sided body form, and bulging eyes in the male; greenish coloration (pl. 4); endosoma with one straight, sharply pointed apical spine with a barb near its apex (fig. 17, pl. 5); left paramere with sinuous dorsal margin of posterior process; right paramere with conspicuously bifid apex (fig. 17). Vestiture of dorsum pale to weakly darkened. Structure of apical endosomal spine distinctive among *Bifidostylus* spp., but structure of parameres and endosoma concordant; uniform green coloration as in many *Bifidostylus* species. Female weakly ovoid and with smaller eyes than male. Similar to *B. silveirae* in size, large eyes in male, and occupation of multiple hosts, but separated by the pair of broad apical endosomal spines and more elongate parallel-sided body form in that species.

DESCRIPTION: *MALE*: Moderate size, elongate ovoid, mean total length 3.33, mean pronotum width 0.94. COLORATION (pl. 4): Pale green; membrane pale. SURFACE AND VESTITURE (pl. 4): Dorsum smooth, polished, moderately shining; dorsal vestiture of recumbent, pale to dark, simple setae. STRUCTURE: **Head** (pl. 4): Eyes large, protuberant, vertex relatively narrow; frons not swollen, clypeus visible from above; eye occupying slightly more than two-thirds height of head; antenna inserted somewhat above ventral margin of eye, eye emarginate at insertion; antennal segment 2 relatively short (0.84), 1.12 times width of head; labium reaching to posterior margin of mesosternum. **Thorax** (pl. 4): Pronotum with posterior lobe weakly elevated, lateral margin nearly straight, posterior margin distinctly excavate; calli moderately elevated and demarcated along posterior margin; mesoscutum moderately exposed. *Hemelytron*: Corial margin weakly convex; cuneus broadly triangular. GENITALIA (fig. 17, pl. 5): **Pygophore:** Triangular with pair of long bristles on either side. **Endosoma:** Sigmoid, straps contiguous to level of secondary gonopore; ventral strap terminating at base of gonopore, dorsal strap extending beyond gonopore, bifid distally, terminating in apical spine and subapical barb; secondary gonopore well sclerotized, situated within interstrap membrane conforming to contour of endosoma. **Phallotheca:** Apical portion elongate conical, somewhat broadened subapically, elongate ovoid aperture situated on anterodorsal surface; basal portion reaching to middle of ventral surface of pygophore in situ. **Parameres:** Left paramere with undulating dorsoposterior margin slightly elevated above anterior and posterior processes; posterior process moderately long, slightly undulating in lateral view and straight in dorsal view; anterior process

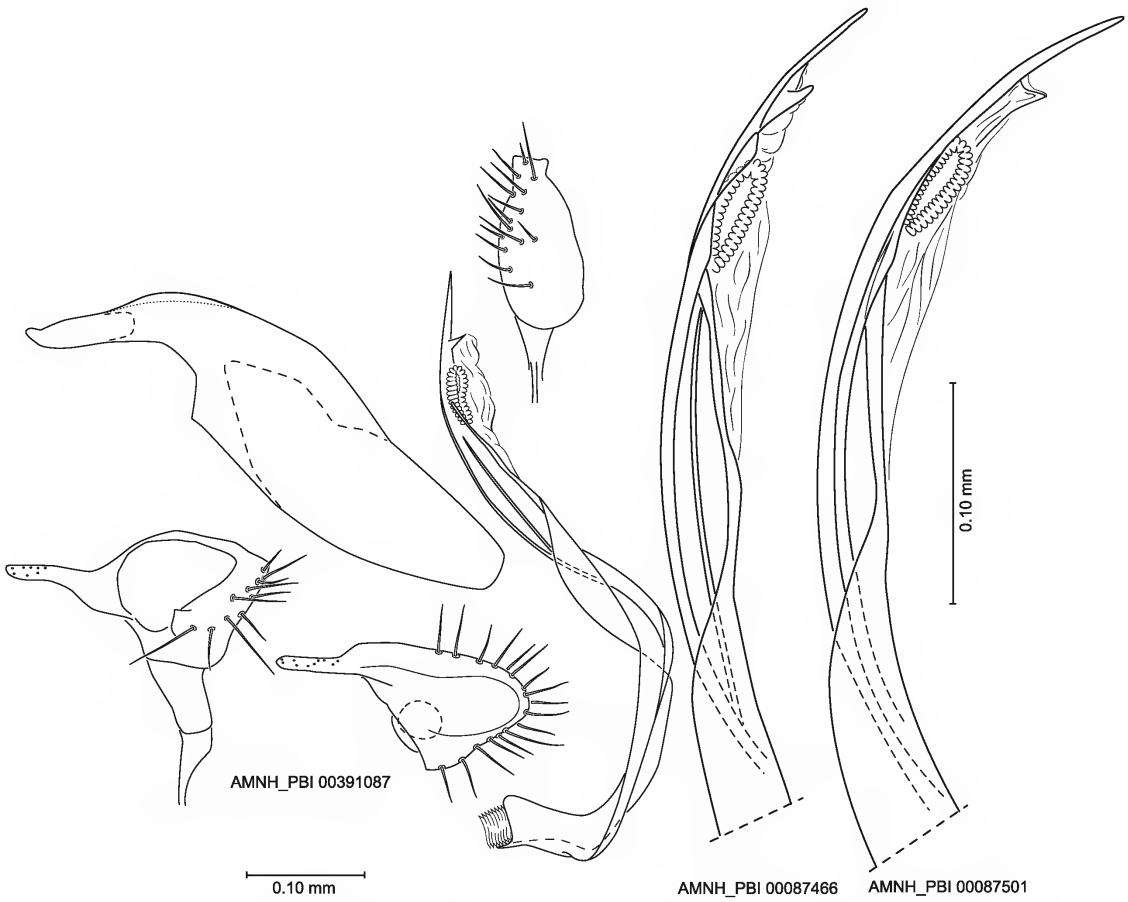


Fig. 17. Male genitalic structures of *Bifidostylus omnivorus*.

minute, barely produced beyond body of paramere, long seta present ventrad of anterior process. Right paramere somewhat swollen with well-defined bifid apex.

Female (pl. 4): Elongate ovoid, similar in shape to male; mean total length 3.19, mean pronotum width 0.96. Coloration and vestiture as in male. Eyes smaller and vertex somewhat wider than in male, frons moderately swollen and exceeding anterior margin of eye.

Etymology: From the Latin, *omnis*, "all," and *vorare*, "to devour," in reference to the broader range of known hosts for this taxon than is the case for most species of *Bifidostylus*.

Hosts: Recorded from *Eremophila duttonii* (pl. 38A, B), *E. freelingii, E. macdonnellii*, *E. willsii*, and *Eremophila* sp. (Scrophulariaceae). Also recorded from *Parthenium hysterophorus* (Asteraceae) and *Amyema lucasii* (Loranthaceae).

Distribution (map 5): Most records from western New South Wales and the Alice Springs region of Central Australia. We examined a single specimen from the Kalbarri National Park in Western Australia that we have identified as this species.

Discussion: Of the species we place in *Bifidostylus,* this one has been most commonly collected. Most specimens were collected on *Eremophila*, representing at least three species, although some specimens are documented as occurring on other hosts.

Holotype: **AUSTRALIA: South Australia:** 8 km S of Martins Well, 31.40001°S 139.0753°E, 187 m, 08 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila* sp.

(Scrophulariaceae), det. Field ID NSW666362, 1♂ (AMNH_PBI 00412106) (SAMA).

PARATYPES: **AUSTRALIA: New South Wales:** 92 km SW Bourke toward Louth (4 km E of Louth), 30.53334°S 145.1667°E, 100 m, 27 Oct 1995, Schuh and Cassis, *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. J. Everett 1996 NSW 398422, 6♀ (00412747, 00412748, 00389957–00389960), 2♂ (00389955, 00389956), *Amyema lucasii* (Blakely) Danser (Loranthaceae), det. B.M. Wiecek 1996 NSW 395950, 6♂ (00389371–00389375, 00087209), 16♀ (00389385–00389399, 00087210) (AM), *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. J. Everett 1996 NSW 398422, 1♂ (00412746), *Amyema lucasii* (Blakely) Danser (Loranthaceae), det. B.M. Wiecek 1996 NSW395950, 3♂ (00392825, 00087501, 00087466), 2♀ (00392826, 00392827) (AMNH). **Northern Territory:** 1 km S of Henbury Craters Nature Reserve, 24.56668°S 133.1234°E, 457 m, 29 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. NSW staff NSW658411, 3♂ (00098277–00098279), 4♀ (00098281–00098284) (AM), 2♂ (00391087, 00098280) (AMNH). 45.3 km NW of Bond Springs on Tanami Rd, 23.51668°S 133.4626°E, 695 m, 21 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. NSW staff NSW658298, 3♂ (00098034, 00098035, 00391086), 7♀ (00098036–00098042) (AMNH). 67 km E of Stuart Hiway on Arltunga Stn Rd, 23.28027°S 134.37°E, 714 m, 27 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. NSW staff NSW658367, 46♂ (00097480–00097523, 00097132, 00389939), 96♀ (00097524–00097618, 00097133) *Parthenium hysterophorus* L. (Asteraceae), det. NSW staff NSW658367, 2♀ (00098078, 00098079) (AMNH). 74.8 km E of Yuendumu on Mt Denison-Coniston Rd, 22.1°S 132.4231°E, 646 m, 24 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Parthenium hysterophorus* L. (Asteraceae), det. NSW staff NSW658323, 6♂ (00097447–00097452), 5♀ (00097453–00097457) (AMNH). Henbury Station, 14 km NE from Henbury Homestead, North of Chandler Range approx 2.3 km from Stuart Highway, 24.46556°S 133.35194°E, 549 m, 17 May 2013, M. Cheng & C. Duykers, 1♂ (00413299), 7♀ (00413300–00413306) (UNSW). Henbury Station, Claypan, 20.7 km SE from Henbury Homestead, 24.63456°S 133.43717°E, 413 m, 23 May 2013, M. Cheng, *Eremophila willsii* F. Muell. (Scrophulariaceae), 1♀ (00413307) (UNSW). Henbury Station, Gloaming Dam, 25.5 km E of Henbury Homestead, 24.59806°S 133.50306°E, 434 m, 23 May 2013, M. Cheng, host undetermined, 1♂ (00387480), 3♀ (00387481–00387483) (UNSW). Henbury Station: 10 km W of Henbury Homestead, 24.605°S 133.16528°E, 435 m, 15 May 2013, M Cheng, *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 2♂ (00413213, 00413214), 2♀ (00413273, 00413274) (ANIC), 2♂ (00413211, 00413212), 2♀ (00413271, 00413272) (CNC), 57♂ (00387354–00387359, 00413176–00413185, 00413189–00413208, 00413217–00413236, 00413297), 55♀ (00387360–00387363, 00413239–00413268, 00413277–00413296, 00413298) (UNSW), 2♂ (00413215, 00413216), 2♀ (00413275, 00413276) (USNM), 2♂ (00413209, 00413210), 2♀ (00413269, 00413270) (ZISP). **South Australia:** 8 km S of Martins Well, 31.40001°S 139.0753°E, 187 m, 08 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666362, 85♂ (00412061–00412105, 00412107–00412145, 00412180), 43♀ (00412186–00412228) (AMNH), 39♂ (00412146–00412179, 00412181–00412185), 30♀ (00412229–00412258) (SAMA). Witchelina Nature Reserv, ap. 40 km NW of Lyndhurst, 30.05639°S 137.47028°E, 205 m, 13 Oct 2010, A. Namyatova, host undetermined – Cassis Lab, UNSW – Bush Blitz, 6♂ (00387443–00387446, 00413308, 00413309), 7♀ (00387449, 00387450, 00413310–00413314) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.0565°S 137.97082°E, 205 m, 20 Oct 2010, M. Elias, *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. botanist – Dept. of Env. & Natural Resources, South Australia, 23♂ (00387447, 00387448, 00413354–00413371, 00413378–00413380), 5♀ (00413372–00413376) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.0542°S 137.95916°E, 156 m, 13 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 9♂ (00413315–00413323), 30♀ (00413324–00413353) (UNSW). **Western Australia:** Kalbarri National Park, Z-Bend Road, 27.61971°S 114.3864°E, 500 m, 28 Oct 1996, Schuh and Cassis, 4♂ (00414256–00414259) (AM), 3♂ (00414253–00414255) (AMNH).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: New South Wales:** 92 km SW Bourke toward Louth

(4 km E of Louth), 30.53334°S 145.1667°E, 100 m, 27 Oct 1995, Schuh and Cassis, *Amyema lucasii* (Blakely) Danser (Loranthaceae), det. B.M. Wiecek 1996 NSW 395950, 9 nymphs (00389376–00389384) (AM). **Northern Territory:** Henbury Station: 10 km W of Henbury Homestead, 24.605°S 133.16528°E, 435 m, 15 May 2013, M Cheng, *Eremophila duttonii* F. Muell. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 2 nymphs (00413237, 00413238) (UNSW).

Bifidostylus silveirae, new species
Figures 8, 18, map 5, table 1, plates 4, 5, 42A, B, D

Diagnosis: Recognized by moderate size, elongate, parallel-sided body form, and bulging eyes in male; greenish coloration (fig. 8A, B, pl. 4; endosoma with both straps broad before apex, one strap extending well beyond secondary gonopore, the other only slightly exceeding it and forming a cleft at level of gonopore (fig. 18, pl. 5); left paramere with sinuous dorsal margin of posterior process; right paramere with conspicuously bifid apex. Apical structure of endosomal spines distinctive among *Bifidostylus* spp., but structure of parameres and endosoma concordant; uniform green coloration as in many *Bifidostylus* species; vestiture of dorsum ranging from pale to dark. Female not so elongate and with smaller eyes than male. Similar to *B. omnivorus* in coloration, large eyes in male, and occupation of multiple hosts, but separated by the single, slender, apical endosomal spine and the more strongly ovoid body form in that species.

Description: *Male*: Relatively small, parallel sided, mean total length 3.17, mean pronotum width 0.89. COLORATION (pl. 4): Pale green; membrane moderately fumose. SURFACE AND VESTITURE (fig. 8A–C, pl. 4): Dorsum smooth, weakly polished and shining; dorsal vestiture of recumbent, dark, simple setae. STRUCTURE: **Head** (fig. 8A, B): Eyes large, protuberant; vertex relatively narrow; frons weakly swollen and slightly projecting beyond anterior margin of eye; eye occupying two-thirds height of head; antenna inserted somewhat above ventral margin of eye, eye emarginate at insertion; antennal segment 2 moderately long (0.95), 1.36 times width of head; labium reaching to just beyond apex of procoxa. **Thorax** (fig. 8B, pl. 4): Pronotum with posterior lobe weakly elevated, lateral and posterior margins nearly straight; calli obscure, weakly demarcated along posterior margin; mesoscutum moderately exposed; thoracic pleuron as in figure 8D. Pretarsus as in figure 8F. *Hemelytron*: Corial margin straight; cuneus weakly elongate triangular. GENITALIA (figs. 8E, 18, pl. 5): **Pygophore:** Broadly conical with one variable tubercle present midway between left paramere insertion and anterior margin of pygophore. **Endosoma:** Sigmoid or J-shaped (twisting of endosoma apparently depending on preservation), when sigmoidal distal one-half bent to left; dorsal and ventral straps joined apically, both straps forming somewhat thickened blades; ventral strap projecting distad of secondary gonopore as broad spine, base of spine contiguous with base of subapical spine projecting from dorsal strap; subapical secondary gonopore well sclerotized, situated in membrane spanning hollowed, medial, weakly sclerotized notch of ventral strap; gonopore surrounded by membrane. **Phallotheca:** Apical portion pitcher shaped, strongly broadened subapically, compressed or flattened in dorsal view, aperture situated on anterodorsal surface, elongate, extending to apex, strongly sclerotized marginally; basal portion reaching to middle of ventral surface of pygophore in situ. **Parameres:** Left paramere relatively large with undulating dorsoposterior margin prominently elevated above anterior and posterior processes; posterior process long, undulating in lateral view and sinuous in dorsal view; anterior process small, produced beyond surface of paramere, long seta present ventrad of process. Right paramere somewhat swollen with well-defined bifid apex.

Female (pl. 4): Elongate ovoid, mean total length 3.08, mean pronotum width 0.91. Coloration and vestiture as in male. Eyes smaller and vertex somewhat wider than in male. GENITALIA as in plate 42A, B, D.

Etymology: Named from Rossana Silveira, in recognition of her collection of this species and other contributions to our knowledge of Australian Cremnorrhinina.

Hosts: Recorded from *Eremophila caperata* (pl. 37A–C), *E. mitchellii, E. platythamnos* (pl. 38H), and *E. sturtii* (pl. 39C–E)

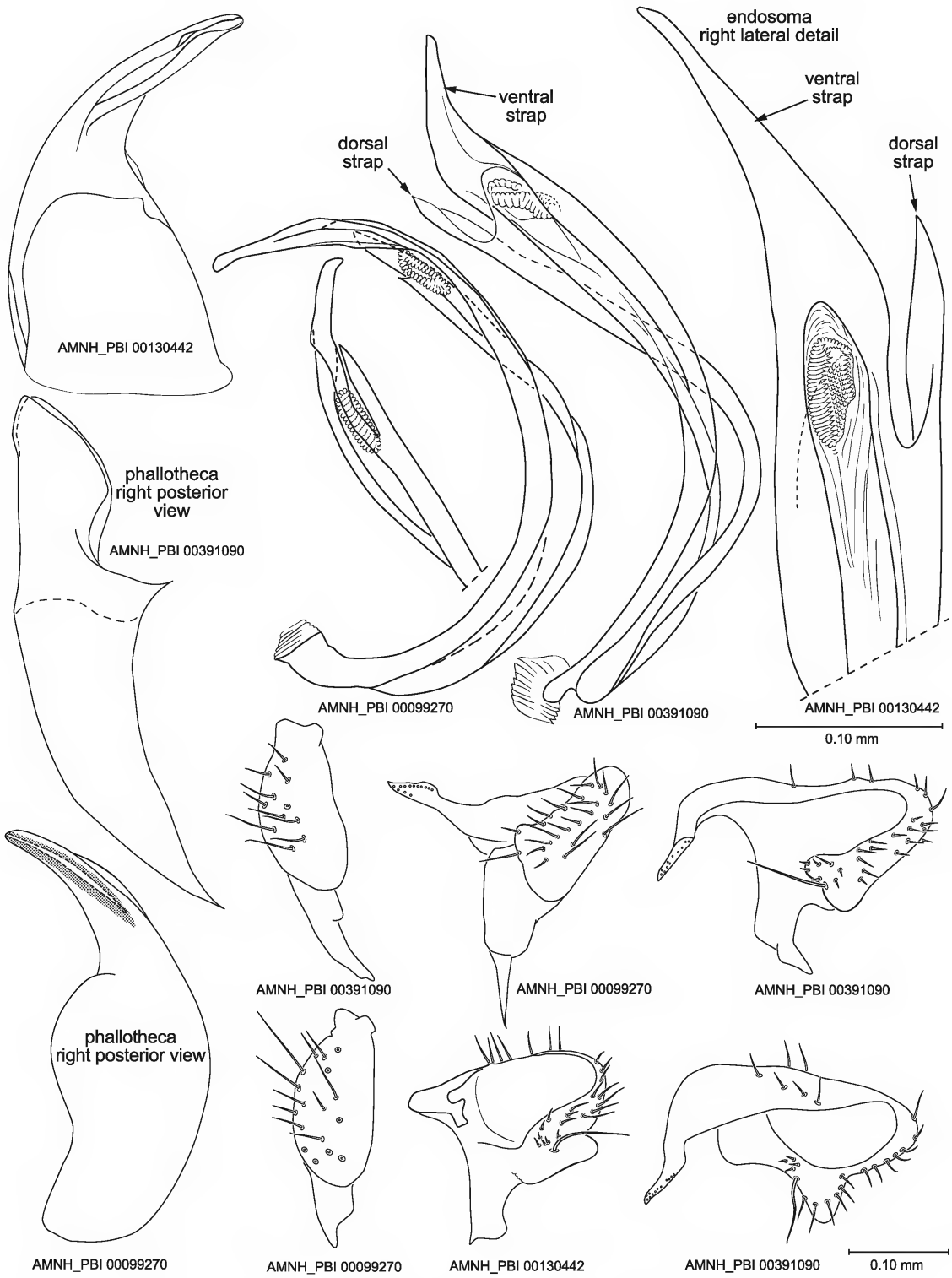


Fig. 18. Male genitalic structures of *Bifidostylus silveirae*.

(Scrophulariaceae); also recorded from *Frankenia* sp. (Frankeniaceae) and *Eucalyptus populnea* (Myrtaceae).

DISTRIBUTION (map 5): Known from south-central Queensland and western New South Wales as well as from the Goldfields Region of Western Australia.

DISCUSSION: This is one of the most frequently collected species of *Bifidostylus*, based on the collections we have examined. Most known specimens were collected on four different species of *Eremophila*, although the taxon is also known from *Eucalyptus* and *Frankenia*. Pygophore tubercle varies from a modest bump to narrow straight-sided projection.

HOLOTYPE: **AUSTRALIA: South Australia:** 14.3 km S of Erudina Woolshed, 31.53334°S 139.5506°E, 86 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♂ (AMNH_PBI 00099248) (SAMA).

PARATYPES: **AUSTRALIA: New South Wales:** 77.2 km E of Broken Hill on Barrier Hiway, 31.76668°S 142.2592°E, 150 m, 10 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♂ (00391053) (AM), 3♂ (00099597–00099599), 9♀ (00099601–00099609) (AMNH). **Queensland:** 9.6 km W of Mitchell, 26.49202°S 147.8728°E, 430 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila mitchellii* Benth. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427506, 2♂ (00414646, 00414648), 6♀ (00414649, 00414652–00414654), 00414656, 00414657) (AM), *Eucalyptus populnea populnea* (Myrtaceae), det. Royal Bot Gard. NSW NSW427492, 1♂ (00130500), 5♀ (00130501–00130505) (AMNH). 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, 1♂ (00389863) (AM). 48.6 km NW of Charleville, 26.14706°S 145.8637°E, 365 m, 01 Nov 1998, Schuh, Cassis, Silveira, *Eremophila mitchellii* Benth. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427510, 5♂ (00087305, 00389886–00389889), 14♀ (00087306, 00389890–00389902) (AM), 3♂ (00130574–00130576), 9♀ (00130577–00130585) (AMNH). 91 km N of Quilpie, 25.99847°S 144.4098°E, 300 m, 02 Nov 1998, Schuh, Cassis, Silveira, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427514, 24♂ (00389131–00389144, 00389157–00389162, 00087211, 00389846, 00389847, 00389850), 26♀ (00389145–00389156, 00389163–00389167, 00087212, 00389848, 00389849, 00389851–00389856) (AM), 2♂ (00087467, 00391090) (AMNH). **South Australia:** 10.3 km W of Quondong Vale, 33.1137°S 140.2231°E, 100 m, 08 Nov 1996, Schuh and Cassis, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05236592, 8♂ (00388866–00388872, 00391091), 23♀ (00388873–00388895) (AM), 6♂ (00135331–00135334, 00128495, 00135337), 21♀ (00128496–00128498, 00135338–00135353, 00135361, 00135362) 1♂ (00137422) (AMNH), 2♂ (00135335, 00135336), 7♀ (00135354–00135360) (SAMA). 14.3 km S of Erudina Woolshed, 31.53334°S 139.5506°E, 86 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♂ (00391089) (AM), 31♂ (00099190–00099201, 00099250–00099263, 00412295, 00097188, 00099270, 00099271, 00413023), 46♀ (00099205–00099227, 00099237, 00099238, 00099249, 00099272–00099287, 00099289, 00097189, 00099295, 00099296) (AMNH), 1♂ (00099204), 2♀ (00099233, 00099234) (ANIC), 1♂ (00099203), 2♀ (00099231, 00099232) (CNC), 6♂ (00099264–00099269), 6♀ (00099288, 00099290–00099294) (SAMA), 2♀ (00099235, 00099236), 1♂ (00412294) (USNM), 1♂ (00099202), 2♀ (00099228, 00099229) (ZISP). 49.5 km NE of Wooltana Homestead, 30.13754°S 139.7834°E, 150 m, 06 Nov 1998, Schuh, Cassis, Silveira, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427516, 8♂ (00388780–00388784, 00087384, 00087563, 00414413), 18♀ (00388789–00388805, 00087385) (AM), 7♂ (00130441, 00130443–00130447, 00130442), 8♀ (00130448, 00130449, 00130451–00130455, 00130450) (AMNH). 72 km N of Yunta, Nillinghoo Creek, 32.00924°S 139.4523°E, 194 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), 6♂ (00099301–00099305, 00413027), 12♀ (00099306–00099317) (AMNH). **Western Australia:** 31.7 km W of Agnew toward Sandstone, 27.96227°S 120.4277°E, 800 m, 26 Oct 1996, Schuh and Cassis, *Eremophila platythamnos* Diels *platythamnos* (Scrophulariaceae), det. PERTH staff PERTH 05054664, 1♂ (00129855), 4♀ (00129856–00129859) (AMNH). ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila platythamnos* Diels *platythamnos* (Scrophulariaceae), det. PERTH staff PERTH 05054796, 2♂ (00389191,

00389192), 5♀ (00389193–00389197) (AM), 1♂ (00413058) (AMNH).

Other Specimens Examined: **AUSTRALIA: Queensland:** 9.6 km W of Mitchell, 26.49202°S 147.8728°E, 430 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila mitchellii* Benth. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427506, 2 nymphs (00414658, 00414659) (AM). **South Australia:** 49.5 km NE of Wooltana Homestead, 30.13754°S 139.7834°E, 150 m, 06 Nov 1998, Schuh, Cassis, Silveira, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427516, 4 nymphs (00388785–00388788) (AM).

Dicyphylus, new genus

Type Species: *Dicyphylus pilbara,* new species.

Diagnosis: Recognized by the elongate, slender, parallel-sided body form, bulging frons, beady eyes, and overall appearance similar to members of the Dicyphina, including the "tubular" body form, antennal segment 1 often black with a pale apical ring (pl. 6); endosoma usually with proximally directed slender spine subtending secondary gonopore; apex of endosoma always with some elaborations; secondary gonopore delicate (figs. 20–25, pl. 7); phallotheca usually with a one or two fields of denticles on posteroventral surface, if two then field sometimes separated by a trough; and anterior process of left paramere sometimes truncate (figs. 20–25). Tubular body form in *Dicyphylus* unlike flattened body seen in most other members of the Australian Cremnorrhinina, except *Proteophylus* (but *P. acaciae* flattened) and *Telophylus*. The former lacks a lateral endosomal spine; in the latter secondary gonopore flanked by serrate crest at midpoint of endosoma. Most easily confused with species of *Myrtophylus* and *Spinivesica* because of laterally projecting endosomal spine, but those taxa less dicyphinelike in appearance, never with fields of spicules on phallotheca, and never with antennal segment 1 black; *Myrtophylus* with apex of endosoma strongly bifid, and *Spinivesica* with terminal endosomal membrane covered with microtrichia.

Description: *Male*: Weakly to moderately elongate with weakly convex lateral margins, body form tubular, total length 2.10–3.16, pronotum width 0.64–0.85. COLORATION (pl. 6): Ranging from largely pale or green to almost completely black; antennal segment 1 usually black with a contrasting pale apical ring, sometimes other segments also dark; clypeus dark at apex or entirely dark; membrane weakly to moderately fumose, membrane veins contrastingly pale to white. SURFACE AND VESTITURE (fig. 19A–C, pl. 6: Dorsum smooth to weakly rugulose, dull to moderately shining; dorsal vestiture usually of short, black, reclining simple setae, setae sometimes pale. STRUCTURE: General body form more or less tubular, not as broad and flattened as in most other Australian Cremnorrhinina. **Head** (fig. 19A–C, pl. 6): Globular with protuberant globular eyes; eyes occupying slightly more than one-half height of head in lateral view; vertex and frons swollen, frons projecting well beyond anterior margin of eye in dorsal view; clypeus prominent in lateral view; antennal insertion above ventral margin of eye, contiguous with eye, eye not emarginate; labium reaching to about apex of metacoxa. **Thorax** (fig. 19B, pl. 6): Nearly flat, posterior lobe not elevated, lateral and posterior margins weakly concave; calli weakly elevated, polished, and without setae. Pretarsus as in figure 19E, F. *Hemelytron*: Corial margin weakly convex; cuneus weakly elongate. GENITALIA (figs. 19D, 20–25, pl. 7): **Pygophore:** Short, conical or broadly conical with truncate or slightly indented posterior surface. **Endosoma:** Sigmoid or J-shaped, small; basal half of endosomal straps fused dorsally, fused region usually rotated clockwise or to left, otherwise remaining on dorsal surface; usually with proximally directed spine subtending secondary gonopore, with variable diameter, length, and origin; subtending spine sometimes absent; sometimes middle of strap with serrate prominence or smooth flange; secondary gonopore well sclerotized, located subapically within trunk of endosomal shaft; apically with variable number of smooth or spiculate spines and extensive billowy or conforming membrane. **Phallotheca:** Apical portion acutely triangular, strongly sclerotized with compressed dorsal edge and usually with variably developed crest, posteroventral surface usually with field of denticles of variable size apically; posterodorsal surface smooth or with denticles; narrow or compressed ovoid aperture situated on anterodorsal surface; basal

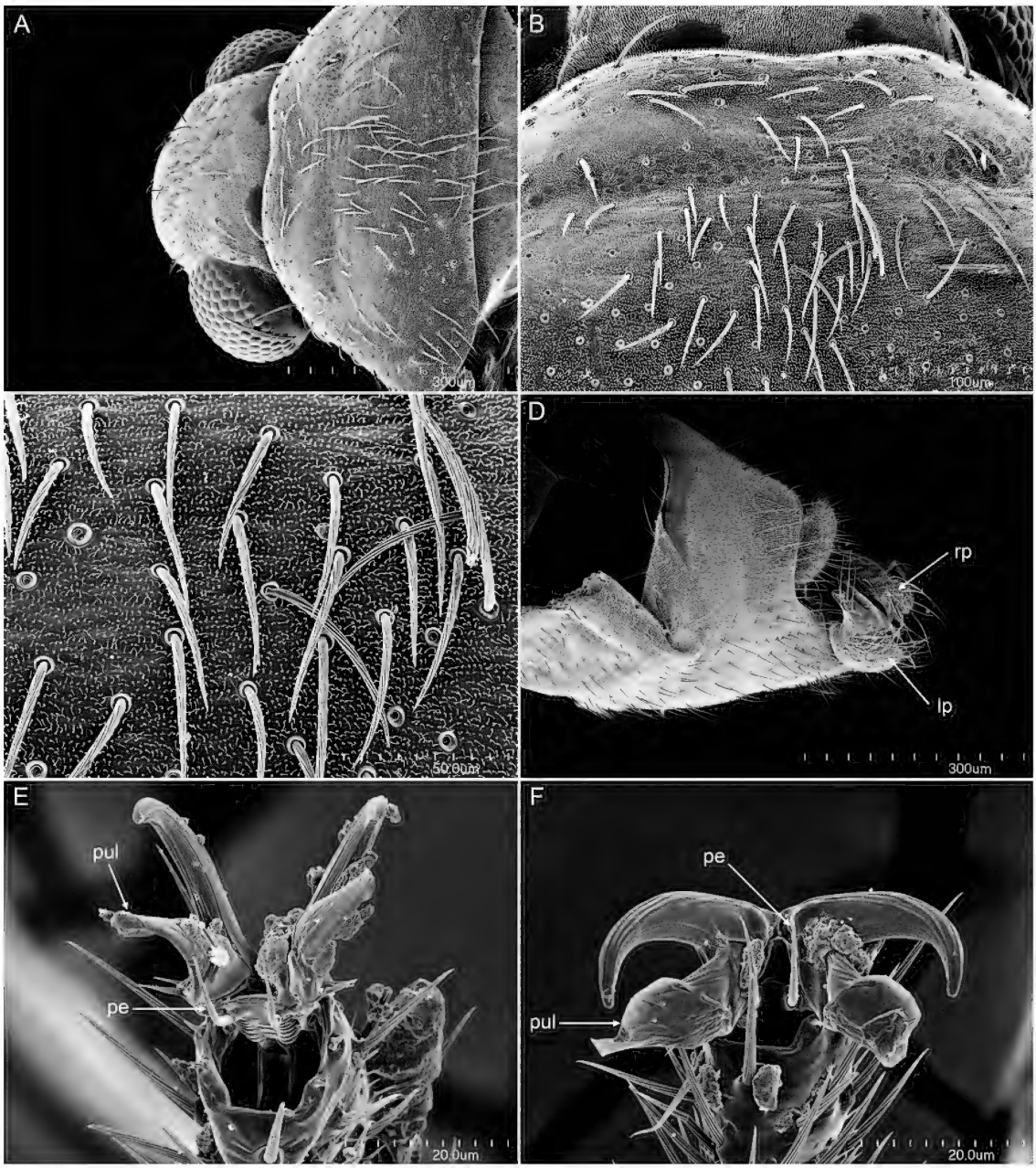
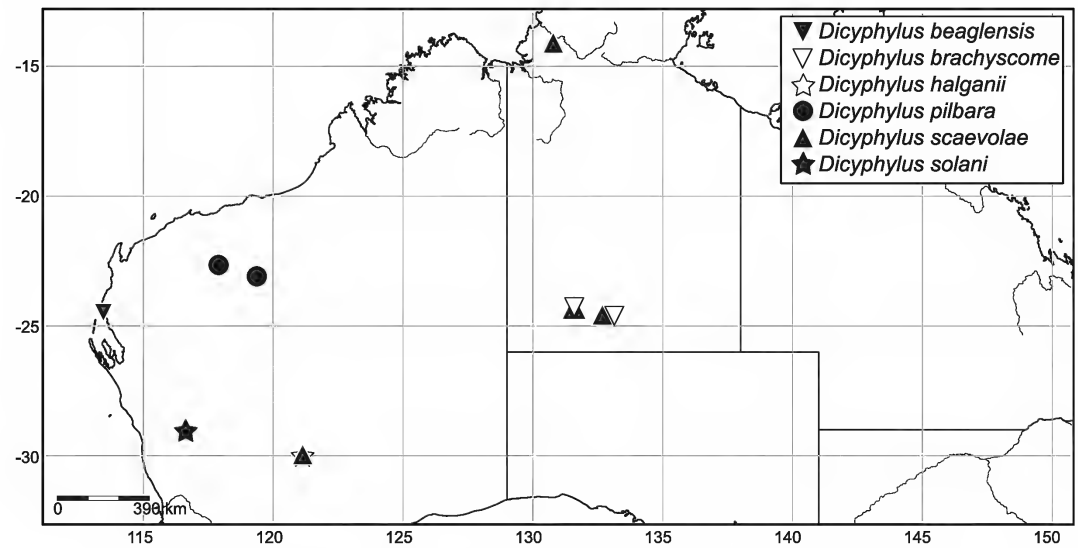


Fig. 19. *Dicyphylus pilbara*. Scanning electron micrographs. **A.** Dorsal view of head and pronotum. **B.** Enlarged view of pronotum. **C.** Detail of pronotal setae. **D.** Lateral view of pygophore. **E.** Frontoventral view of pretarsus. **F.** Frontal view of pretarsus. Abbreviations: **lp,** left paramere; **pe**, parempodium; **pul**, pulvillus; **rp,** right paramere.

portion short, reaching to anterior margin of pygophore aperture in situ. **Parameres:** Left paramere with variable dorsoposterior margin, posterior, and anterior processes; right paramere relatively short, usually tumid, with single dorsoapical projection of variable length.

Female (pl. 4): Elongate, more strongly ovoid than male, total length 2.20–3.06, pronotum width 0.68–0.88. Coloration,



Map 6. Distribution of *Dicyphylus* spp.

surface, and vestiture as in male. GENITALIA (pl. 43): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Relatively large, reaching to anterior margin of dorsal labiate plate. *First gonapophyses*: Medium size, wedge- or bulb-shaped basal blocks. *Ventral labiate plate*: Platelike medial anteroventral extension narrow, divided medially, covering of anterior surface of basal structures. **Dorsal labiate plate:** Moderately long. *Sclerotized rings*: Small or medium sized, widely separated, quadrate or ovoid, weakly concave, with sclerotized extension on posterior angle. *Posteromedial region*: Surface without obvious microstructure. *Anterolateral region*: Narrowly exceeding anterior margin of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Transverse crest-shaped sclerite with serrate posterior margin situated in middle of connecting membrane. *Interramal sclerites*: Well-sclerotized, narrow lateral sclerites, medial sclerite triangular.

Etymology: From the generic name *Dicyphus* Fieber, in reference to the similar habitus to members of the Dicyphini, and the generic name *Phylus*; masculine.

Discussion: The habitus of *Dicyphylus* spp. is remarkably similar to members of the Dicyphini and the host associations have similarities as well. *Dicyphylus* spp. breed on a variety of host families, most host taxa apparently covered with some form of tomentum, a situation commonly seen in the Dicyphini. Although we know nothing about the details of their biology, the available host information suggests that the overall appearance of this apparently monophyletic group is influenced by factors that are related to attributes of the host plants themselves.

Dicyphylus beaglensis, new species
Figure 20, map 6, table 1, plates 6, 7

Diagnosis: Recognized by emerald green pronotum and scutellum, fumose hemelytron and femora, and the fumose to pale antennal segment 1; hemelytral surface appearing more strongly crenulate than in other known species (pl. 6); endosoma with a short serrate prominence subtending the secondary gonopore, a long, basally directed spine adjacent to gonopore, and apex with a short and a long spine, the latter with jagged foliaceous margins (fig. 20, pl. 7). Similar to *D. solani* in having antennal segment 1 pale or weakly infuscate rather than black and in the form of elongate apical endosomal spines with foliaceous margins. Distinguished from *D. solani* by gray coloration of body and contrasting black distal third of antennal segment 2 in that species.

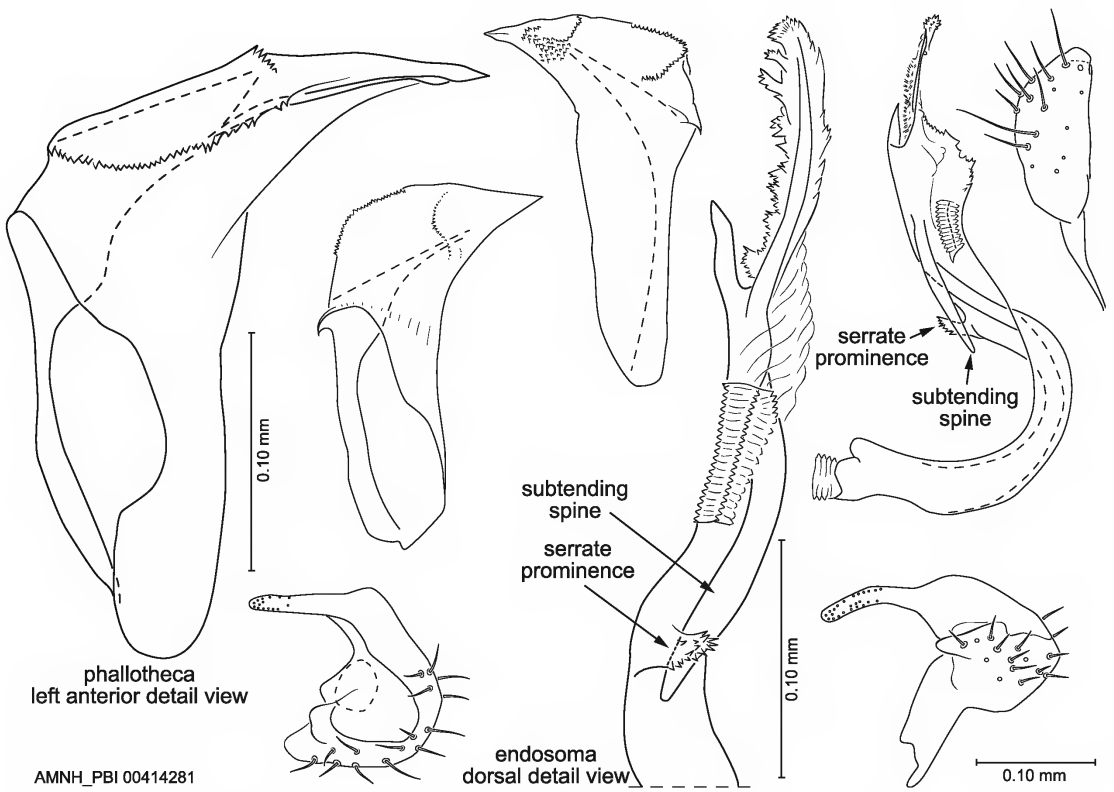


Fig. 20. Male genitalic structures of *Dicyphylus beaglensis.*

DESCRIPTION: *MALE*: Total length 2.65, pronotum width 0.71. COLORATION (pl. 6): Head partially, pronotum mostly, and scutellum emerald green; clypeus unicolorous pale; antennal segment 1 pale, segment 2 unicolorous, weakly to moderately infuscate; hemelytron and appendages fumose; tarsi infuscate, dark, contrasting with remainder of leg. SURFACE AND VESTITURE (pl. 6): Dorsum weakly polished, surface appearing weakly crenulate; dorsal vestiture of short, recumbent, black setae. STRUCTURE: **Head** (pl. 6): As in generic description; antennal segment 2 relatively long (0.96), 1.78 times width of head. **Thorax** (pl. 6): As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 20, pl. 7): **Pygophore:** Conical with shallow indentation on posterior margin, ventrad of left paramere insertion. **Endosoma:** Sigmoid, basal fusion of straps on left side; strap with short serrate prominence medially; long, slender, proximally directed spine subtending secondary gonopore, and two apical spines one short and smooth, other about twice as long and with extensive marginal serration; midpoint of strap with flattened, slightly expanded and marginally serrate spine; secondary gonopore situated just distad of midpoint of endosoma. **Phallotheca:** Apical posteroventral surface with small field of denticles and short transverse row of spicules; posterodorsal edge serrate, curving ventrad on anterior surface. **Parameres:** Left paramere with dorsoposterior margin approximately straight, barely elevated dorsad; posterior process gently deflected; anterior process short, surmounting broad base; prominent seta apparently absent; right paramere with small or indistinguishable anteroapical projection.

FEMALE (pl. 6): Coloration as in male; structure as in generic description; mean total length 2.68, mean pronotum width 0.76.

ETYMOLOGY: Named for its occurrence near Beagle Hill, Western Australia.

HOST: Recorded from *Dicladanthera forrestii* (Acanthaceae).

DISTRIBUTION (map 6): Known from the west coast of Western Australia, north of Carnarvon.

HOLOTYPE: **AUSTRALIA: Western Australia:** Blowholes Rd NW of North West Coastal Hiway, Beagle Hill Area, 24.49068°S 113.4626°E, 20 m, 27 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dicladanthera forrestii* F. Muell (Acanthaceae), det. PERTH staff PERTH6988784, 1♂ (AMNH_PBI 00414281) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** Blowholes Rd NW of North West Coastal Hiway, Beagle Hill Area, 24.49068°S 113.4626°E, 20 m, 27 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dicladanthera forrestii* F. Muell (Acanthaceae), det. PERTH staff PERTH6988784, 2♀ (00414285, 00414286) (AM), 1♂ (00414282), 1♀ (00414287) (AMNH), 2♀ (00414283, 00414284) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** Blowholes Rd NW of North West Coastal Hiway, Beagle Hill Area, 24.49068°S 113.4626°E, 20 m, 27 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dicladanthera forrestii* F. Muell (Acanthaceae), det. PERTH staff PERTH6988784, 6 nymphs (00414288–00414293) (AM).

Dicyphylus brachyscome, new species
Figure 21, map 6, table 1, plates 6, 7

DIAGNOSIS: Recognized by generally pale-green coloration, black antennal segment 1, black basal and apical bands on antennal segment 2, and the dark, contrasting subapical bands on the hind femora; fuscous markings at base of cuneus and apex of membrane cells faint (pl. 6); endosoma with a long, slender, basally directed spine arising adjacent to secondary gonopore and with apical spines in form of an inverted horseshoe (fig. 21, pl. 7). Above-mentioned aspects of coloration similar to *D. scaevolae*, but that species with shorter antennal segment 2 and more pronounced markings on corium at inner angle of cuneus and on membrane. Apex of endosoma in *D. brachyscome* distinct from that of *D. scaevolae*, the latter with two short lateral spines and one long erect spine.

DESCRIPTION: *MALE*: Mean total length 2.42, mean pronotum width 0.72. COLORATION (pl. 6): Pale green; vertex medially and clypeal apex infuscate; antenna largely black, segment 1 with a pale apical ring, segment 2 pale medially; labium infuscate apically; hind femur with a contrasting dark, broad, subapical band; tarsi black. SURFACE AND VESTITURE (pl. 6): Dorsum smooth, weakly polished and weakly shining; dorsum clothed with short, black, reclining, simple setae. STRUCTURE: **Head** (pl. 6): As in generic description; antennal segment 2 relatively long (0.76), 1.49 times width of head. **Thorax** (pl. 6): As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 21, pl. 7): **Pygophore:** Conical with shallow indentation on posterior margin, ventrad of left paramere insertion. **Endosoma:** J-shaped, basal fusion of straps on left side; strap with short, weakly sclerotized flange or broad spine at midpoint, moderately long, slender, proximally directed lateral spine subtending secondary gonopore, and three apical spines, two forming U-shaped membrane-bounded apex, and one sometimes serrate subapical spine; flattened and with small, slightly expanded membranous subapex; secondary gonopore subapical, small curved spine projecting from edge of gonopore distally. **Phallotheca:** Posterior apical surface with two dispersed fields of denticles; posterior dorsal edge serrate, broadly curving ventrad on anterior surface. **Parameres:** Left paramere with dorsoposterior margin undulating, slightly elevated dorsad; posterior process gently deflected; anterior process short, somewhat truncate, base covered with broad field of spicules; prominent seta apparently absent; right paramere with small anteriorly directed apical projection.

FEMALE (pl. 6): Coloration as in male; structure as in generic description; mean total length 2.40, mean pronotum width 0.74.

ETYMOLOGY: Named for the asteraceous genus *Brachyscome*, one of the known hosts; a noun in apposition.

HOSTS: Recorded from *Brachyscome ciliaris* (pl. 31A), *Parthenium hysterophorus* (Asteraceae) and *Solanum* sp. (Solanaceae).

DISTRIBUTION (map 6): Known from the Alice Springs area of Central Australia.

HOLOTYPE: **AUSTRALIA: Northern Territory:** Kings Canyon, Watarrka National

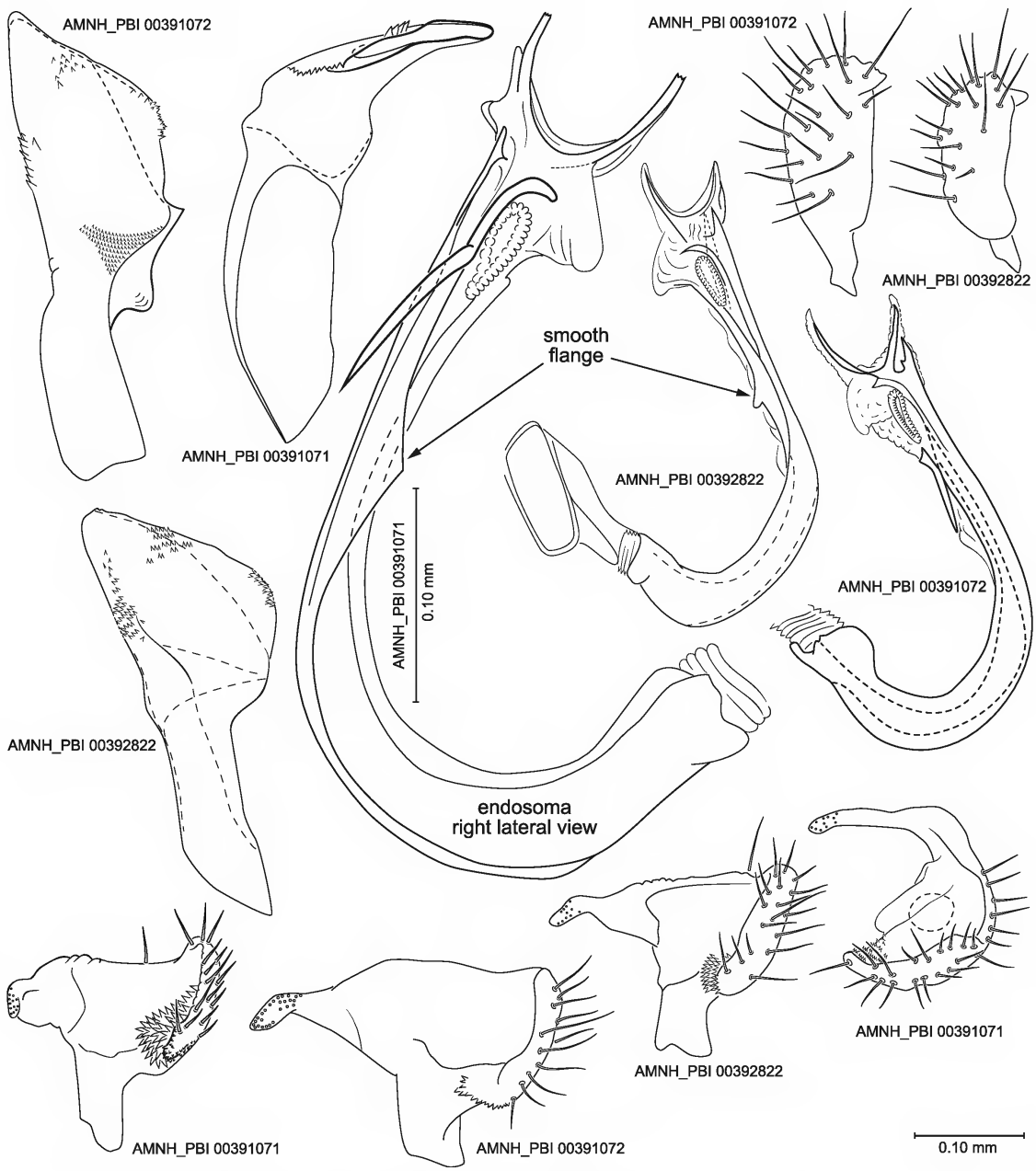


Fig. 21. Male genitalic structures of *Dicyphylus brachyscome*.

Park, 24.25001°S 131.5689°E, 633 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Solanum* sp. (Solanaceae), det. Field ID, 1♂ (AMNH_PBI 00411893) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 1 km S of Henbury Craters Nature Reserve, 24.56668°S 133.1234°E, 457 m, 29 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Brachyscome ciliaris* (Steetz) Benth. var. *lanuginosa* (Asteraceae), det. NSW staff NSW658413, 1♂ (00391072) (AM), 3♂ (00098285, 00098286, 00097153), 9♀ (00098287–00098294, 00097154) (AMNH). Kings Canyon, Watarrka National Park, 24.25001°S 131.5689°E, 633 m, 02 Nov

2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Solanum* sp. (Solanaceae), det. Field ID, 5♂ (00391071, 00411888, 00411890-00411892), 6♀ (00411915-00411920) (AM), 14♂ (00411880–00411886, 00411889, 00411944–00411947, 0039 2821, 00392822), 20♀ (00411894–00411907, 0041 1909, 00411912, 00411948–00411951), *Parthenium hysterophorus* L. (Asteraceae), 1♂ (00097772), 2♀ (00097150, 00097773) (AMNH) *Solanum* sp. (Solanaceae), det. Field ID, 1♂ (00411887), 4♀ (00411910, 00411911, 00411913, 00411914) (MNT).

Dicyphylus halganii, new species
Figure 22, map 6, table 1, plates 6, 7, 43D, E

Diagnosis: Recognized by black pygophore contrasting with pale remainder of abdomen, black antennae and black legs, and fuscous markings on the vertex, pronotum, and scutellum (pl. 6); endosoma with a very long, erect, sinuous, apical spine and a second, shorter subapical spine with two or three strong points (fig. 22, pl. 7). Tubular body and black pygophore contrasting with remainder of abdomen also seen in *Telophylus eremophilae*, but that species with all legs entirely pale and antennae not entirely black, secondary gonopore with medial flanking crest, and endosoma with apical microtrichiate plates diagnostic for *Telophylus;* endosoma in *D. halganii* without flanking crest near secondary gonopore or microtrichiate plates apically.

Description: *Male*: Mean total length 3.01, mean pronotum width 0.73. COLORATION (pl. 6): Background color pale to weakly infuscate, vertex medially, much of pronotum, scutellum medially, claval suture, and corium adjacent to inner angle of cuneus infuscate to dark brown; clypeus, antennae, thoracic pleuron, legs, and pygophore black; abdomen sometimes infuscate, but not black. SURFACE AND VESTITURE (pl. 6): Dorsum smooth, weakly polished and weakly shining, venter dull; dorsum clothed with reclining, pale, simple setae of moderate length. STRUCTURE: **Head** (pl. 6): As in generic description, but antenna inserted above ventral margin of eye by about diameter of antennal fossa; antennal segment 2 relatively short (0.68), 1.28 times width of head. **Thorax** (pl. 6): As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 22, pl. 7): **Pygophore:** Broadly conical, posterior margin indented ventrad of left paramere insertion. **Endosoma:** J-shaped, basal fusion of straps on dorsal side; strap without proximally directed spine, ventral edge of strap with very long, erect apical spine; dorsal edge of strap with three pointed subapical spines (points); endosoma subapically expanded with membrane conforming to endosomal surface; secondary gonopore situated just distad of middle of endosoma on margin of projecting strap. **Phallotheca:** Posteroventral surface of apical portion with dispersed field of denticles, dorsal edge strongly crested without spicules; anterodorsal surface not serrate; aperture ovoid and compressed, anteromedial edge with notch. **Parameres:** Left paramere with dorsoposterior margin faintly undulate, not produced dorsad of posterior and anterior processes; posterior process straight; anterior process large and rounded apically; prominent seta placed apically; right paramere with short anteroapical projection.

Female (pl. 6): Coloration as in male; structure as in generic description; mean total length 2.32, mean pronotum width 0.70. GENITALIA as in plate 43D, E.

Etymology: Named for the boraginaceous genus *Halgania*, host of this taxon.

Host: Recorded from *Halgania cyanea* (pl. 31E) (Boraginaceae).

Distribution (map 6): Known from near Menzies in the Goldfields Region of Western Australia.

Holotype: **AUSTRALIA: Western Australia:** ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Halgania cyanea* Lindl. (Boraginaceae), det. PERTH staff PERTH 05100011, 1♂ (AMNH_PBI 00135583) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Halgania cyanea* Lindl. (Boraginaceae), det. PERTH staff PERTH 05100011, 4♂ (00388712–00388714, 00087388), 34♀ (00388717–00388744, 00087389, 00390145–00390149) (AM), 10♂ (00135573–00135579, 00135582, 00135581, 00087565), 41♀ (00135587–00135609, 00135612–00135627, 00135610, 00135611) (AMNH), 1♂ (00135580), 11♀ (00135628–00135632, 00388745–00388750) (WAMP).

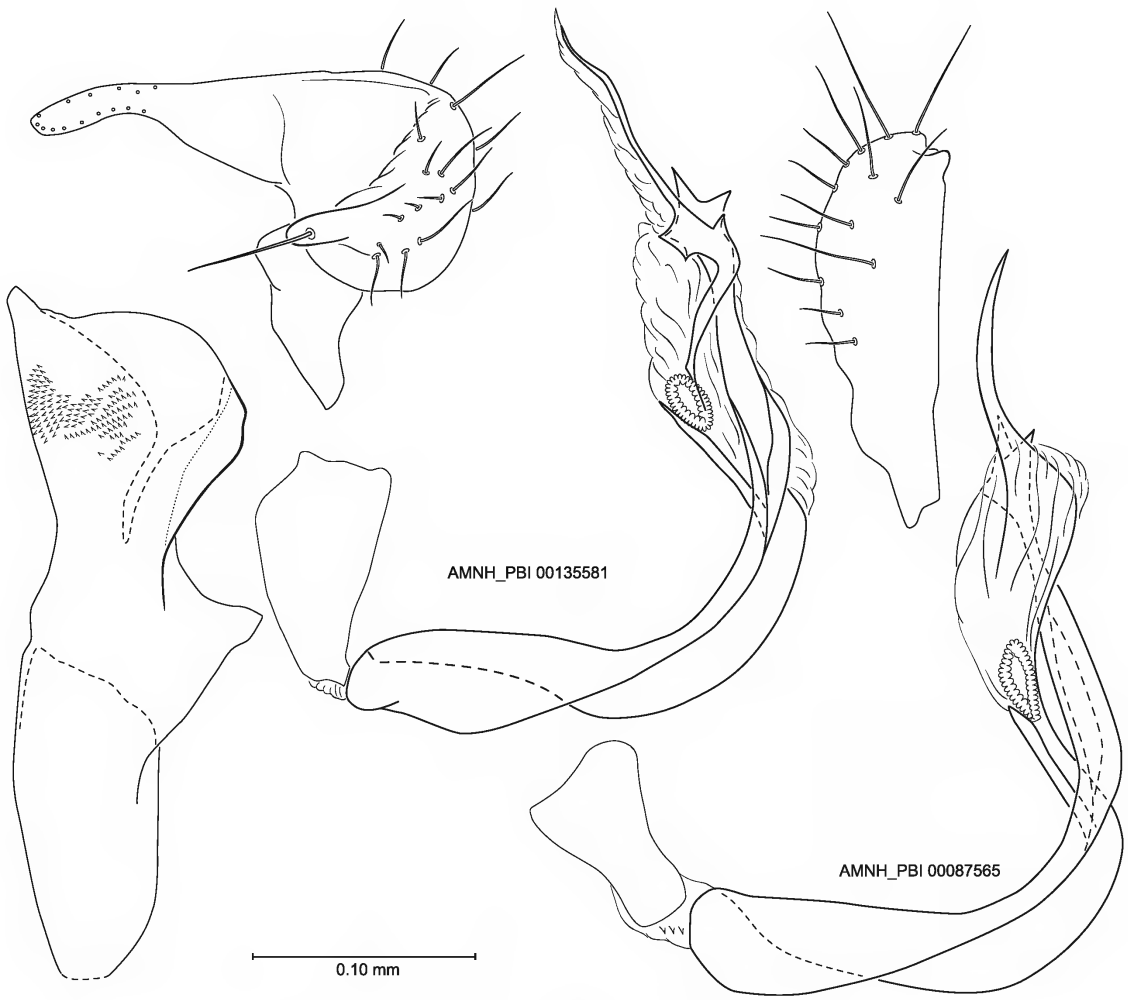


Fig. 22. Male genitalic structures of *Dicyphylus halganii.*

Other Specimens Examined: **AUSTRALIA: Western Australia:** ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Halgania cyanea* Lindl. (Boraginaceae), det. PERTH staff PERTH 05100011, 2 nymphs (00388715, 00388716) (AM), *Halgania cyanea* Lindl. (Boraginaceae), det. PERTH staff PERTH 05100011, 3 nymphs (00135584–00135586) (AMNH).

Dicyphylus pilbara, new species
Figures 19, 23, map 6, table 1, plates 6, 7, 43A–C

Diagnosis: Recognized by the mostly black hemelytron with the basal half of cuneus white and strongly contrasting (pl. 6); endosoma with a stout spine adjacent to gonopore and arising from dorsal rather than ventral surface as in most species, apical spine apparently singular and distinctively with numerous strong spicules over entire length (fig. 23, pl. 7); phallotheca with very large posterior ridge (fig. 23). Black coloration of body and appendages most similar to *D. halganii,* but that species with corium and clavus not entirely black and base of cuneus not contrastingly white; structure of endosomal spines also distinctive for the two species (figs. 22, 23, pl. 7).

Description: *Male*: Mean total length 2.18, mean pronotum width 0.65. COLORATION

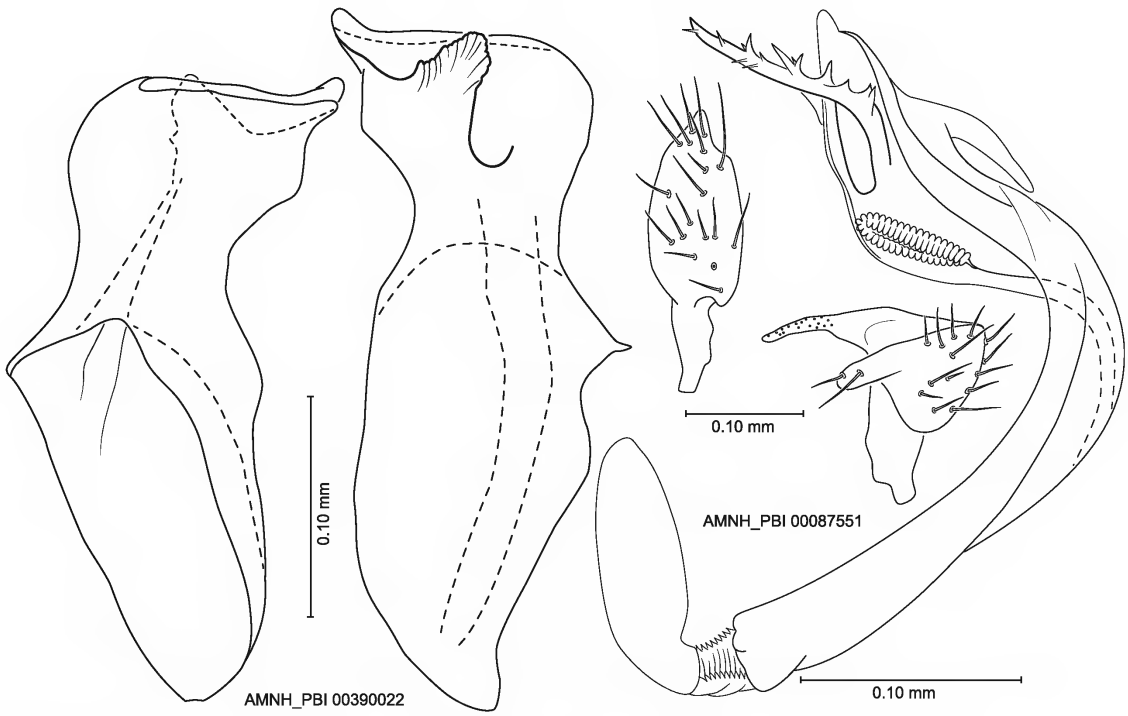


Fig. 23. Male genitalic structures of *Dicyphylus pilbara*.

(pl. 6): Background color black, scutellum laterally, cuneus on basal half, hind femur medially, and hind tibia on apical half much paler; pygophore black, in moderate contrast to remainder of abdomen. SURFACE AND VESTITURE (fig. 19A–C): Dorsum smooth, very weakly polished and weakly shining, venter dull; dorsum clothed with short, black, reclining, simple setae. STRUCTURE: **Head** (fig. 19A–C, pl. 6): As in generic description; antennal segment 2 long (0.74), 1.61 times width of head. **Thorax** (fig. 19A–C, pl. 6): As in generic description. Pretarsus as in figure 19E, F. *Hemelytron*: As in generic description. GENITALIA (figs. 19D, 23, pl. 7): **Pygophore:** Broadly conical, posterior margin indented ventrad of left paramere insertion. **Endosoma:** J-shaped, basal fusion of straps on dorsal side, distal one-half bent to left; strap with stout, proximally directed spine arising laterad and distant from secondary gonopore and one apical spine with numerous conspicuous spicules over entire length; endosoma subapically expanded without inflated membrane; secondary gonopore situated just distad of middle of endosoma on margin of projecting strap. **Phallotheca:** Apical portion with large prominent, serrate ridge on ventroposterior surface, smooth dorsoposterior crest, and narrow trough separating ridge and crest; ridge with height subequal to crest, aperture narrow, slitlike, situated on dorsal edge; posterior surface without denticles or prominent spicules; basal portion with strong internal ridge on right side. **Parameres:** Left paramere with dorsoposterior margin straight, not produced dorsad of posterior and anterior processes; posterior process straight; anterior process large and rounded apically, prominent seta apparently absent; right paramere with relatively long, medial, apical projection.

Female (pl. 6): Coloration as in male; structure as in generic description; mean total length 2.33, mean pronotum width 0.71. GENITALIA: As in plate 43A–C.

Etymology: Named for the Pilbara Region of Western Australia, the area of the type locality; a noun in apposition.

Host: Recorded from *Olearia xerophila* (Asteraceae).

DISTRIBUTION (map 6): Known from the Pilbara District of Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** Pilbara Dist., 21 km NW of Tom Price, 22.6513°S 117.8853°E, 712 m, 01 Jun 1999, G. Cassis, R. Silveira, *Olearia xerophila* (F. Muell.) Benth. (Asteraceae), det. WA Herbarium PERTH5636485, 1♂ (AMNH_PBI 00390109) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** Pilbara Dist., 21 km NW of Tom Price, 22.6513°S 117.8853°E, 712 m, 01 Jun 1999, G. Cassis, R. Silveira, *Olearia xerophila* (F. Muell.) Benth. (Asteraceae), det. WA Herbarium PERTH5636485, 29♂ (00389989–00389994, 00389996–00389998, 00390001–00390017, 00390021, 00390022, 00390047), 37♀ (00390028–00390037, 00390046, 00390048–00390052, 00390055, 00390056, 00390058–00390062, 00390064, 00390117–00390129), 1♂ (00087551) (AM), 22♂ (00389988, 00389995, 00389999, 00390000, 00390098–00390108, 00390110–00390116), 14♀ (00390053, 00390054, 00390057, 00390063, 00390065–00390074), 1♂ (00087360), 1♀ (00087361) (AMNH), 2♂ (00390024, 00390025), 2♀ (00390042, 00390043) (ANIC), 2♂ (00390020, 00390023), 2♀ (00390040, 00390041) (CNC), 2♂ (00390026, 00390027), 2♀ (00390044, 00390045) (USNM), 2♂ (00390018, 00390019), 2♀ (00390038, 00390039) (ZISP). Pilbara Dist., Rhodes Ridge Camp, 23.10137°S 119.3705°E, 694 m, 30 May 1999, G. Cassis, R. Silveira, *Olearia xerophila* (F. Muell.) Benth. (Asteraceae), det. WA Herbarium PERTH5636485, 13♂ (00390079–00390091), 6♀ (00390092–00390097) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** Pilbara Dist., 21 km NW of Tom Price, 22.6513°S 117.8853°E, 712 m, 01 Jun 1999, G. Cassis, R. Silveira, *Olearia xerophila* (F. Muell.) Benth. (Asteraceae), det. WA Herbarium PERTH5636485, 7 nymphs (00390075–00390078, 00390130–00390132) (AM).

Dicyphylus scaevolae, new species
Figure 24, map 6, table 1, plates 6, 7

DIAGNOSIS: Recognized by generally pale green coloration, black antennal segment 1, black basal and apical bands on antennal segment 2, and dark, contrasting subapical bands on the hind femur; distinct fuscous markings at base of cuneus and apex of membrane cells (pl. 6); endosoma with a long, slender, basally directed, lateral spine arising adjacent to the secondary gonopore and with one long, erect apical spine subtended by two shorter laterally directed spines (fig. 24, pl. 7). Above mentioned aspects of coloration very similar to *D. brachyscome*, but that species with longer antennal segment 2 and less pronounced markings on corium at base of cuneus and on membrane. Apex of endosoma in *D. scaevolae* distinct from that of *D. brachyscome*, the latter with the apical spines in the form of an inverted horseshoe.

DESCRIPTION: *MALE*: Mean total length 2.72, mean pronotum width 0.78. COLORATION (pl. 6): Pale green; vertex medially and apex of clypeus infuscate; antennae largely black, segment 1 with a pale apical ring, segment 2 pale medially; labium infuscate apically; hind femur with a contrasting dark, broad, subapical band; tarsi black. SURFACE AND VESTITURE (pl. 6): Dorsum smooth, weakly polished and weakly shining; dorsum clothed with short, black, reclining, simple setae. STRUCTURE: **Head** (pl. 6): As in generic description; antennal segment 2 long (0.90), 1.67 times width of head. **Thorax** (pl. 6): As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 24, pl. 7): **Pygophore:** Conical with shallow indentation on posterior margin, ventrad of left paramere insertion. **Endosoma:** J-shaped, basal fusion of straps on left side; strap with obscure medial flange; long, slender, proximally directed lateral spine subtending secondary gonopore; four terminal spines, one long apical spine and three shorter lateral spines, one bifid, two straight; subapical membrane reduced; secondary gonopore subapical. **Phallotheca:** Posteroventral apical surface with dispersed field of denticles, dorsal edge of field with distinct spicules; shallow trough between spicules and posterodorsal edge; dorsal portion of posterior surface not serrate. **Parameres:** Left paramere with dorsoposterior margin relatively straight, slightly produced dorsad; posterior process gently deflected; anterior process short, base covered with broad field of spicules; prominent seta somewhat longer than other apical setae; right paramere with small anteriorly directed projection.

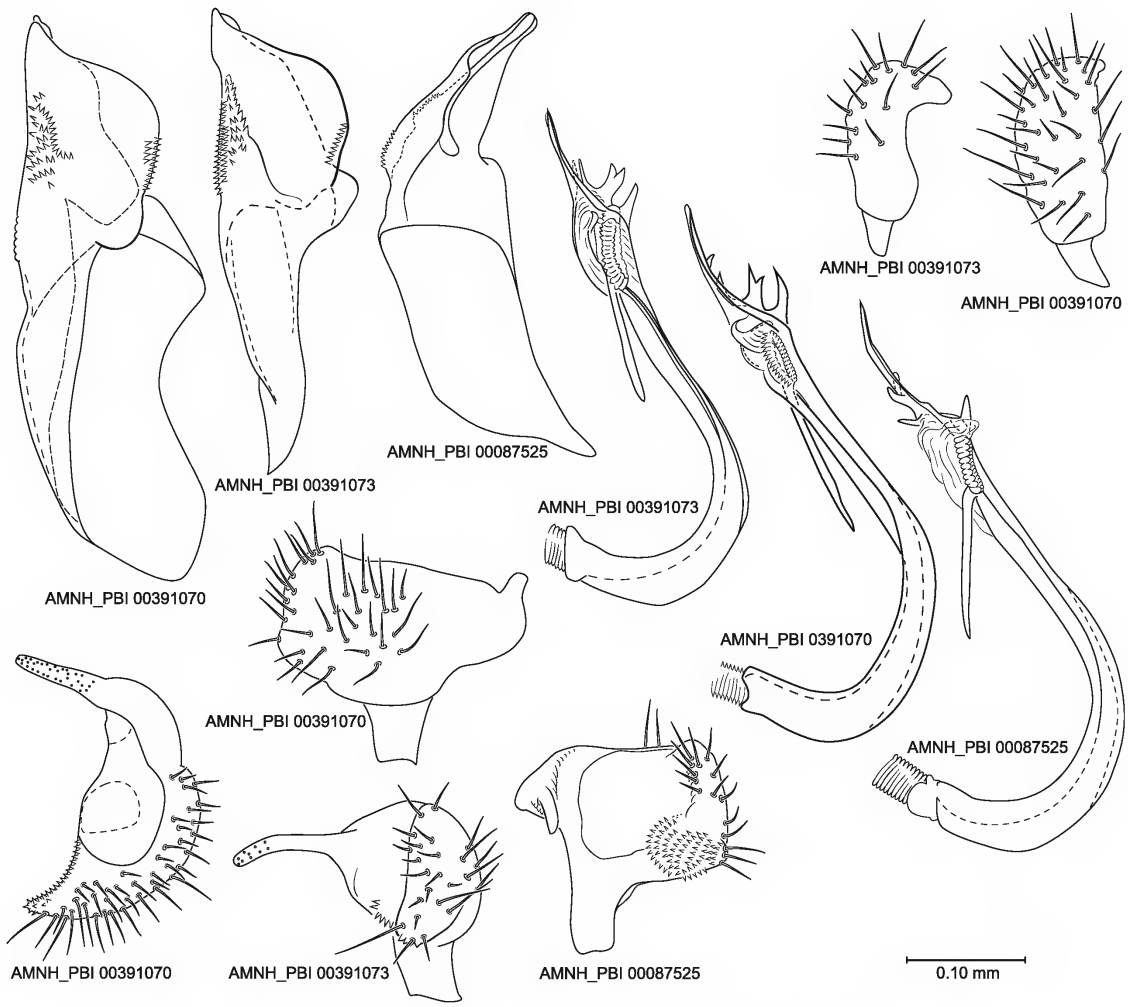


Fig. 24. Male genitalic structures of *Dicyphylus scaevolae*.

Female (pl. 6): Differing from male as in generic description; mean total length 2.83, mean pronotum width 0.84.

Etymology: Named for the goodeneaceous genus *Scaevola*, one of the known hosts of this taxon.

Hosts: Recorded in large numbers from *Goodenia ramelii* (pl. 33C) and *Scaevola ovalifolia* (Goodeniaceae). Recorded in small numbers on *Brachyscome ciliaris* (Asteraceae) and *Solanum* sp. (Solanaceae).

Distribution (map 6): Recorded from the Goldfields region of Western Australia and the Alice Springs area of Central Australia.

Holotype: **AUSTRALIA: Western Australia:** 28 km S of Menzies, 29.92835°S 121.1231°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Goodenia ramelii* F. Muell. (Goodeniaceae), det. PERTH staff PERTH 05120748, 1♂ (AMNH_PBI 00087311) (WAMP).

Paratypes: **AUSTRALIA: Northern Territory:** Fish River Station, S24b camp, 14.0981°S 130.79442°E, 53 m, 24 Apr 2012, C. Symonds, at light, 1♂ (UNSW_ENT 00025582) (UNSW). Kings Canyon, Watarrka National Park, 24.25001°S 131.5689°E, 633 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Scaevola ovalifolia* R. Br. (Goodeniaceae), det. NSW staff NSW666306, 4♀ (00098640–00098643), 1♂ (00391070) (AM), 1♀ (00097170) (AMNH). ~44 km W of Stuart Hiway on Ernest Giles Rd, 24.56668°S 132.6815°E, 494 m, 30 Oct

2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Scaevola ovalifolia* R. Br. (Goodeniaceae), det. NSW staff NSW666250, 1♂ (00391073) (AM), 3♂ (00098448, 00097161, 00098454), 7♀ (00098449–00098453, 00097162, 00098455) (AMNH). **Western Australia:** 28 km S of Menzies, 29.92835°S 121.1231°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Goodenia ramelii* F. Muell. (Goodeniaceae), det. PERTH staff PERTH 05120748, 9♂ (00087525, 00390151–00390154, 00390156–00390159), 17♀ (00390135–00390139, 00390141, 00390143, 00390163–00390165, 00390167–00390173) (AM), 2♂ (00390160, 00390161), 2♀ (00390174, 00390175) (AMNH), 5♀ (00087312, 00390140, 00390142, 00390144, 00390166), 4♂ (00390133, 00390134, 00390150, 00390155) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 28 km S of Menzies, 29.92835°S 121.1231°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Goodenia ramelii* F. Muell. (Goodeniaceae), det. PERTH staff PERTH 05120748, 1 nymph (00390162) (AM).

Dicyphylus solani, new species
Figure 25, map 6, table 1, plates 6, 7

Diagnosis: Recognized by pale to grayish general coloration and medial infuscation on the head, pronotum, and scutellum, in addition to scattered infuscate areas on the hemelytron; antennae mostly pale except distal half of segment 2 black; apical half of clypeus infuscate (pl. 6); endosoma relatively slender, J-shaped, with a slender, basally directed lateral spine of moderate length adjacent to secondary gonopore and two apical spines, one slender, simple, and of moderate length, the other much longer, erect, and serrate along one edge (fig. 25, pl. 7). Structure of endosoma similar to that of *D. beaglensis*, but that species with emerald-green pronotum and scutellum and with antennal segment 2 uniformly pale to infuscate rather than strongly contrasting black and pale as in *D. solani*.

Description: *Male*: Mean total length 2.29, mean pronotum width 0.72. COLORATION (pl. 6): Background coloration pale to grayish; dorsum with medial infuscate line on head, pronotum, and scutellum; hemelytron with scattered infuscate areas; antennae mostly pale except distal half of segment 2 black; apical half of clypeus infuscate. SURFACE AND VESTITURE (pl. 6): Dorsum weakly polished, weakly shining; dorsal vestiture of short, recumbent black setae. STRUCTURE: **Head** (pl. 6): As in generic description; antennal segment 2 relatively long (0.77), 1.57 times width of head; labium reaching almost to apex of abdomen. **Thorax:** As in generic description. GENITALIA (fig. 25, pl. 7): **Pygophore:** Conical, posterior margin slightly produced ventrad of left paramere insertion. **Endosoma:** J-shaped, basal fusion of straps on left side; strap with moderately long, slender, proximally directed lateral spine surmounting secondary gonopore, and two apical spines one short curved and smooth, other spine longer, flattened and with marginal serration merging with wider field of denticles; secondary gonopore situated just distad of middle of endosoma. **Phallotheca:** Posterior ventroapical surface and dorsal edge without denticles or more prominent spicules. **Parameres:** Left paramere with dorsoposterior margin strongly produced with broad prominence posteromedially; posterior process gently deflected; anterior process relatively long; prominent seta apical; right paramere with relatively long dorsoapical projection.

Female (pl. 6): Coloration as in male; structure as in generic description; mean total length 2.55, mean pronotum width 0.76.

Etymology: Named for the solanaceous genus *Solanum*, the host of this taxon.

Host: Recorded from *Solanum lasiophyllum* (pl. 39G) (Solanaceae).

Distribution (map 6): Known from the area east of Geraldton, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Lochada, Windinie Hill, 29.03475°S 116.63166°E, 407 m, 15 Sep 2009, C. Symonds, *Solanum lasiophyllum* Poir. (Solanaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00414540) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Lochada, Windinie Hill, 29.03475°S 116.63166°E, 407 m, 15 Sep 2009, C. Symonds, *Solanum lasiophyllum* Poir. (Solanaceae), det. WA Herbarium, 1♂ (00414538), 3♀ (00414541, 00414545, 00414542) (AMNH), 1♂ (00414539), 8♀ (00414543, 00414544, 00414546–00414550, 00414554) (UNSW), 4♀ (00414551–00414553, 00414555) (WAMP).

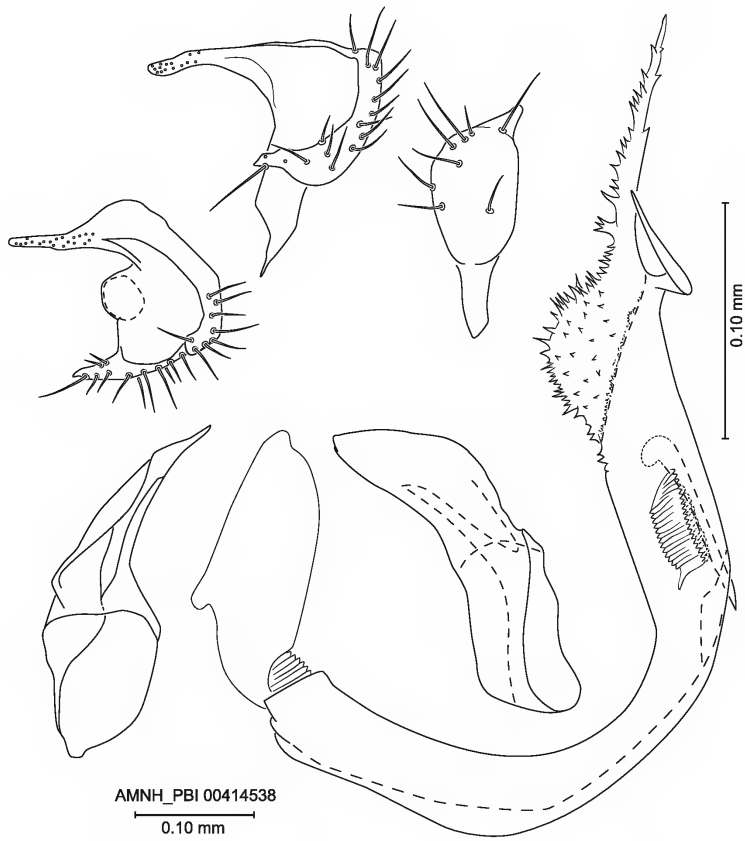


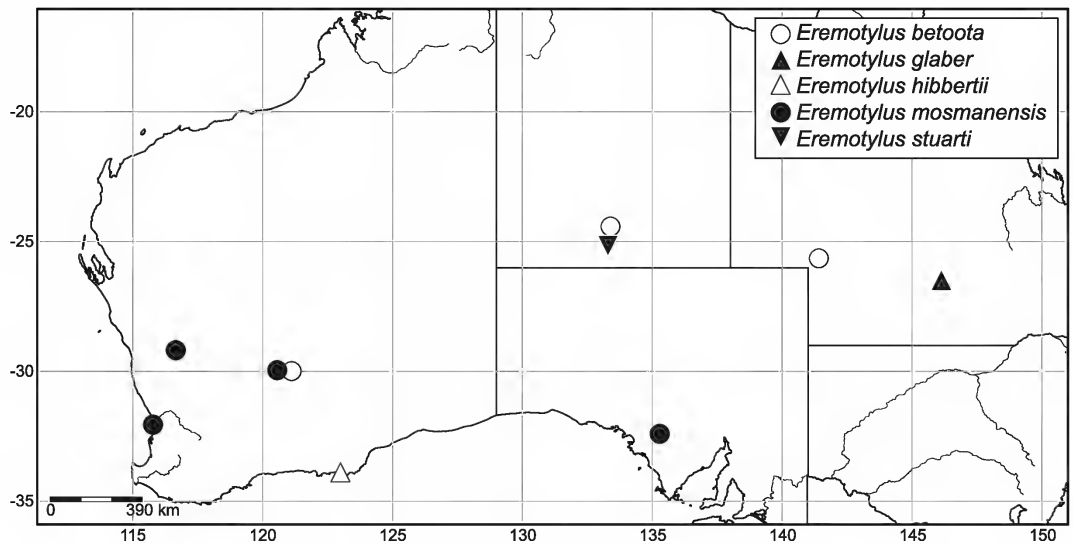
Fig. 25. Male genitalic structures of *Dicyphylus solani.*

Eremotylus, new genus

TYPE SPECIES: *Eremotylus stuarti,* new species.

DIAGNOSIS: Recognized by the ovoid to elongate-ovoid body form and green to yellowish coloration; dorsum sometimes with a dark spot on membrane at apex of cells or on corium at inner angle of cuneus (pl. 8); endosoma sigmoid, usually with one short and one long spine apically, sometimes with broad subapical flap (figs. 26–30, pl. 9). Possibly confused with *Gyrophallus* on form of apical endosomal spines, but that taxon always with endosoma twisted (like a rope) (pls. 13, 15) as opposed to being just sigmoid. *Gyrophallus* also always with conspicuous apical endosomal membranes with some denticles, attributes never seen in *Eremotylus.*

DESCRIPTION: *MALE*: Total length 2.83–3.85, pronotum width 0.79–0.99. COLORATION (pl. 8): Green to yellowish, including all appendages, hemelytron sometimes nearly transparent; hemelytron either without markings, or occasionally corium with infuscate mark adjacent to inner angle of cuneus and/or membrane with infuscate spot at apex of cells. SURFACE AND VESTITURE (pl. 8): Dorsum smooth, polished and weakly to strongly shining. Dorsum clothed with recumbent simple setae, sometimes pale, but often dark. STRUCTURE: **Head** (pl. 8): Short, transverse; frons at most weakly surpassing anterior margin of eyes; eyes moderately large, usually weakly bulging, confluent with anterior margin of pronotum; occupying about two-thirds height of head; antenna inserted near ventral margin of eye; antennal segment 2 ranging from short to long. **Thorax** (pl. 8): Pronotum with lateral margins nearly straight to weakly sinuous, anterior lobe short, calli weakly to distinctly demarcated



Map 7. Distribution of *Eremotylus* spp.

along posterior margin, posterior lobe at most weakly elevated, posterior margin straight to weakly concave, with rounded humeral angles; mesoscutum weakly to broadly exposed; scutellum triangular, flat. *Hemelytron*: Short to moderately elongate, corial margin nearly straight to moderately convex. GENITALIA (figs. 26–30, pl. 9): **Pygophore:** Broadly or elongate conical, dorsal surface anteriad of aperture sometimes with narrow tubercle on left side, rarely also with bump on right side; sometimes with conspicuous long bristle bilaterally near paramere insertions. **Endosoma:** Sigmoid, apical portion sometimes bent to left in dorsal view; ventral strap usually terminating proximad of secondary gonopore and dorsal strap usually bifid proximal to or distad of secondary gonopore with one long and one short apical spine; secondary gonopore well sclerotized, circular, situated subapically. **Phallotheca:** Apical portion narrow, dorsal margin with narrow crest or without crest, aperture usually narrow, slitlike, sometimes wider, situated on anterodorsal margin and continuous across apex, or on posterior side; basal portion reaching to middle of pygophore in situ. **Parameres:** Left paramere usually relatively elongate in dorsal view, rarely more compact; usually with medial portion of dorsoposterior margin undulating, strongly elevated above posterior and anterior processes, sometimes dorsoposterior margin practically straight; posterior process usually with bent distal one-half and undulating lateral margin in dorsal view, sometimes posterior process straight; anterior process variable. Right paramere usually of moderate length, usually with one rather broad truncate apical projection.

Female (pl. 8): Total length 2.64–3.81, pronotum width 0.81–1.09. Coloration and structure as in male, except vertex wider, antennal segment 2 usually more slender, and body form more strongly ovoid. GENITALIA (pl. 44): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, attaining anterior edge of dorsal labiate plate. *First gonapophyses*: Moderate size, wedge-shaped basal blocks. *Ventral labiate plate*: Platelike, medial anteroventral extension narrow, covering anterior surface of basal structures. **Dorsal labiate plate:** Relatively short longitudinally. *Sclerotized rings*: Moderately large, relatively flat, thick walled, teardrop shaped, medial angle strongly attenuate. *Posteromedial region*: Surface without apparent microstructure. *Anterolateral region*: Anterior margin even with anterior edge of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Not

differentiated from connecting membrane. *Interramal sclerites*: Weakly sclerotized, lateral sclerites narrow, medial sclerite apparently absent.

ETYMOLOGY: From the Greek, *eremos*, "solitary or lonely," and *tylus*, "knob, nose," in reference to the projecting face of most members of the Cremnorrhinina; masculine.

Eremotylus betoota, new species
Figure 26, map 7, table 1, plates 8, 9

DIAGNOSIS: Recognized by the moderate size (mean length 3.00), elongate oval body, almost opaque hemelytron, and uniform green coloration in living specimens (pl. 8). Endosoma relatively short, weakly sigmoid, with one short and one long, slender apical spine just apicad of secondary gonopore (figs. 26–30, pl. 9); left paramere with a distinctly undulating posterior process (figs. 26–30). Similar to *E. glaber*, but that species somewhat more elongate and endosoma with two short spines and one long broadened apical spine, rather than one long, slender spine and one short spine; posterior process of left paramere also undulating in *E. glaber* and *E. stuarti*.

DESCRIPTION: *MALE:* Mean total length 3.00, mean pronotum width 0.81. COLORATION (pl. 8): Light green in life, changing to weakly orange when preserved; hemelytron almost opaque; membrane weakly fumose with a dark spot at apex of cells. SURFACE AND VESTITURE (pl. 8): Dorsum smooth, weakly shining; vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 8): Short, vertex broad, eyes relatively large, frons not or only weakly swollen and projecting anterior to eye, eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye emarginate above insertion; antennal segment 2 relatively short and stout (0.80), 1.22 times width of head; labium reaching to posterior margin of mesosternum. **Thorax** (pl. 8): Mesoscutum moderately exposed. *Hemelytron*: Weakly elongate, costal margin nearly straight, cuneus relatively short. GENITALIA (fig. 26, pl. 9): **Pygophore:** Broadly conical. **Endosoma:** Distal one third bent to left in dorsal view, dorsal strap bifid distad of secondary gonopore, apically with one short and one long slender spine. **Phallotheca:** Apical portion narrow, dorsal margin without crest, aperture narrow slitlike, situated on anterodorsal margin and continuous across apex. **Parameres:** Left paramere elongate with dorsoposterior margin produced medially; posterior process bent with undulating lateral margin; anterior process absent with anterior region conforming to contour of paramere; long seta situated on anteromedial surface. Right paramere apically with small posterior and anterior points.

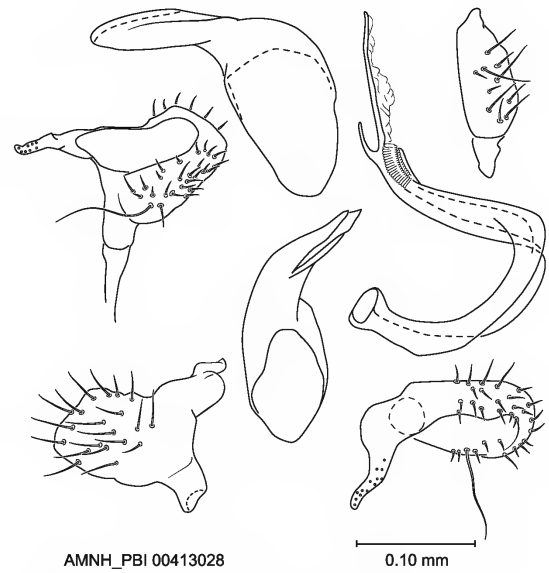


Fig. 26. Male genitalic structures of *Eremotylus betoota*.

FEMALE (pl. 8): Mean total length 2.80, mean pronotum width 0.85; antennal segment 2 more slender than in male.

ETYMOLOGY: Named for the town of Betoota, Queensland, near the type locality; a noun in apposition.

HOST: Most known specimens recorded from *Eremophila latrobei* (Scrophulariaceae). A single adult specimen and two nymphs are recorded from *Prostanthera cambellii* (pl. 33D) (Lamiaceae).

DISTRIBUTION (map 7): Known from the Alice Springs region of Central Australia and from Betoota in far southwestern Queensland.

HOLOTYPE: **AUSTRALIA: Northern Territory:** Henbury Station, 20.6 km NE of

Henbury Homestead along Stuart Highway, 24.41°S 133.38583°E, 479 m, 16 May 2013, M. Cheng, C. Bayer, & M. Colquhoun, *Eremophila latrobei* F. Muell. subsp. *glabra* (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♂ (AMNH_PBI 00387535) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** Henbury Station, 20.6 km NE of Henbury Homestead along Stuart Highway, 24.41°S 133.38583°E, 479 m, 16 May 2013, M. Cheng, C. Bayer & M. Colquhoun, *Eremophila latrobei* F. Muell. subsp. *glabra* (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♂ (00387434), 1♀ (00387536) (UNSW). **Queensland:** 73.7 km E of Betoota, 25.60813°S 141.3999°E, 180 m, 03 Nov 1998, Schuh, Cassis, Silveira, *Eremophila latrobei* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427517, 1♂ (00087233), 7♀ (00087234, 00389802–00389805, 00390863, 00390864) (AM), 2♂ (00413028, 00389801), 4♀ (00414885–00414888), 4♀ (00414885–00414888) (AMNH), 2♀ (00389806, 00389807) MNT. **Western Australia:** ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Prostanthera campbellii* F. Muell. (Lamiaceae), det. PERTH staff PERTH 05099714, 1♂ (00414277) (AM).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Prostanthera campbellii* F. Muell. (Lamiaceae), det. PERTH staff PERTH 05099714, 2 nymphs (00414278, 00414279) (AM).

Eremotylus glaber, new species

Figure 27, map 7, table 1, plates 8, 9

DIAGNOSIS: Recognized by the moderately large size, elongate oval body, almost opaque hemelytron, and uniform green coloration in living specimens (pl. 8). Endosoma moderately elongate, slender, weakly sigmoid, with two short spines and one long spine, one of the short spines subtending the secondary gonopore, the other two just apicad of the gonopore (fig. 27, pl. 9); left paramere with a distinctly undulating posterior process (fig. 27). Body shape and structure of endosomal spines similar to *E. stuarti*, with two short and one long apical spines. Also similar to *E. betoota*, but that species somewhat less elongate and endosoma with one short spine and one long apical spine, rather than one long and two short spines; posterior process of left paramere undulating as in *E. betoota* and *E. stuarti*.

DESCRIPTION: *MALE:* Mean total length 3.40, mean pronotum width 0.84. COLORATION (pl. 8): Light green in life, changing to weakly yellow when preserved, hemelytron almost opaque; membrane pale. SURFACE AND VESTITURE (pl. 8): Dorsum smooth, weakly shining; vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 8): Short, moderately broad, eyes of moderate size, frons not or only weakly swollen and only slightly projecting anterior to eye, eye occupying two-thirds height of head; antennae inserted just above ventral margin of eye, eye weakly emarginate at and above insertion; antennal segment 2 relatively long and slender (0.94), 1.45 times width of head; labium reaching to about midpoint of mesosternum. **Thorax** (pl. 8): Mesoscutum moderately exposed. *Hemelytron*: Weakly elongate, costal margin very weakly convex, cuneus weakly elongate. GENITALIA (fig. 27, pl. 9): **Pygophore:** Elongate conical, dorsal surface anteriad of aperture with narrow tubercle on left side and bump on right side; single long bristle anteriad of each paramere insertion. **Endosoma:** Dorsal strap bifid distad of secondary gonopore, apically with one short and one long spine; ventral strap terminating with subapical spine subtending secondary gonopore. **Phallotheca:** Apical portion narrow, dorsal margin without crest, aperture narrow slitlike, situated on anterodorsal margin and continuous across apex. **Parameres:** Left paramere elongate with medial portion of dorsoposterior margin produced; posterior process bent with undulating lateral margin; anterior process minute, sharp; long seta situated mediad of anterior process. Right paramere apically with a conspicuous anterior projection and small posterior projection.

FEMALE (pl. 8): Mean total length 3.29, mean pronotum width 0.92. Coloration as in male; structure as in generic description.

ETYMOLOGY: Named for the host, *Eremophila glabra* (Scrophulariaceae).

HOST: Recorded from *Eremophila glabra* (Scrophulariaceae).

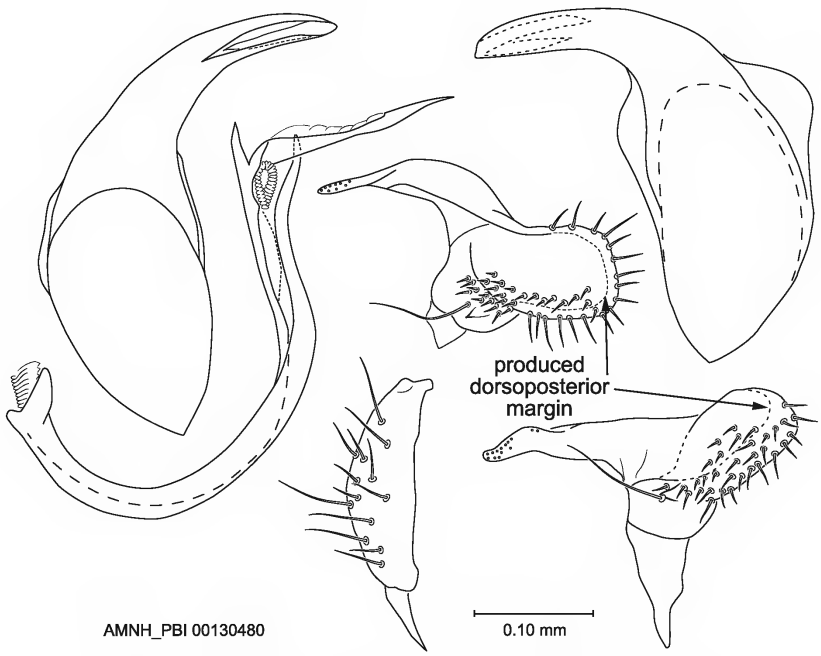


Fig. 27. Male genitalic structures of *Eremotylus glaber*.

Distribution (map 7): Known from the type locality near Charleville, south-central Queensland.

Holotype: **AUSTRALIA: Queensland:** 10.8 km NW of Charleville, 26.44062°S 146.1584°E, 360 m, 01 Nov 1998, Schuh, Cassis, Silveira, *Eremophila glabra* (R. Br.) Ostenf. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427509, 1♂ (AMNH_PBI 00130479) (QM).

Paratypes: **AUSTRALIA: Queensland:** 10.8 km NW of Charleville, 26.44062°S 146.1584°E, 360 m, 01 Nov 1998, Schuh, Cassis, Silveira, *Eremophila glabra* (R. Br.) Ostenf. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427509, 1♂ (00130478), 2♀ (00130481, 00130482) (AM), 1♂ (00130480) (AMNH).

Eremotylus hibbertii, new species
Figure 28, map 7, table 1, plates 8, 9

Diagnosis: Recognized by the moderately large size, elongate oval body, almost opaque hemelytron, and uniform green coloration in living specimens (yellow in available preserved material) (pl. 8). Endosoma relatively stout, sigmoid, with one long, broad apical spine and a "flap" at about midpoint of secondary gonopore (fig. 28, pl. 9); left paramere with dorsoposterior margin and posterior process practically straight (fig. 28). Similar to *E. glaber*, but endosoma in that species with two short spines and one long apical spine, rather than one long broad spine and also a "flap" as found in *E. hibbertii*; posterior process of left paramere straight in *E. hibbertii* as opposed to bent in *E. glaber*.

Description: *Male:* Mean total length 3.85, mean pronotum width 0.96. COLORATION (pl. 8): Orange when preserved, hemelytron almost opaque; membrane weakly fumose. SURFACE AND VESTITURE (pl. 8): Dorsum smooth, weakly shining; vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 8): Short, vertex moderately broad, eyes of moderate size, frons not or only weakly swollen and projecting anterior to eye, eye occupying slightly less than three-quarters height of head; antennae inserted somewhat above ventral margin of eye, eye weakly emarginate above insertion; antennal segment 2 long and slender (1.18), 1.84 times width of head;

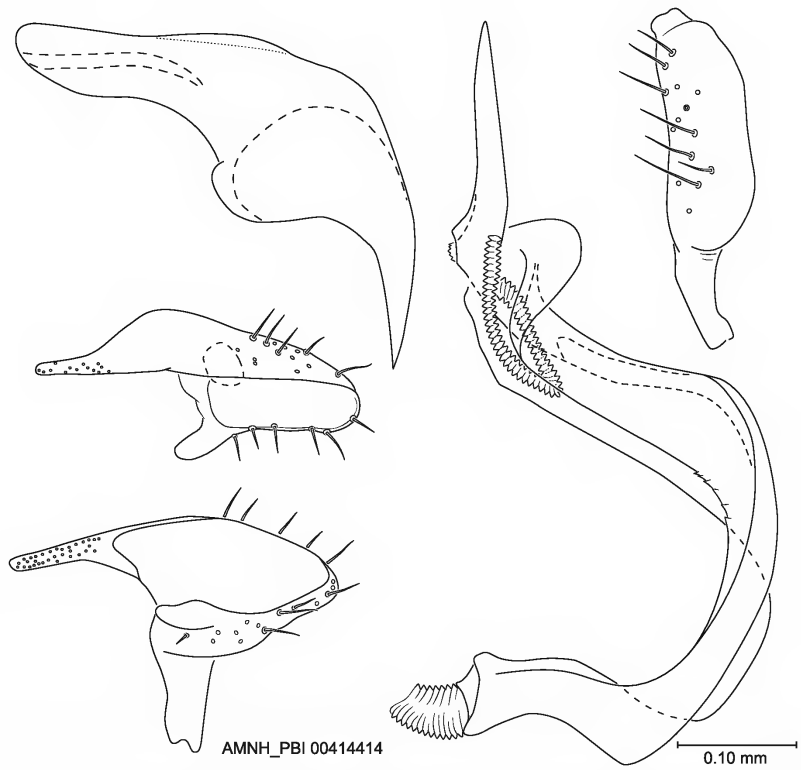


Fig. 28. Male genitalic structures of *Eremotylus hibbertii*.

labium reaching to apex of mesocoxa. **Thorax** (pl. 8): Mesoscutum moderately exposed. *Hemelytron*: Elongate, costal margin weakly convex, cuneus moderately elongate. GENITALIA (fig. 28, pl. 9): **Pygophore:** Elongate conical; single long bristle anteroventrad of each paramere insertion. **Endosoma:** Dorsal and ventral straps separated medially, dorsal strap entire with long, broad apical spine; ventral strap with broad flaplike sclerite distad of secondary gonopore; secondary gonopore large with long, narrow distal extension adhered to edge of dorsal strap. **Phallotheca:** Apical portion elongate conical, dorsal margin with very narrow crest basad; aperture situated on anterodorsal margin; internal basal portion with slight basal outpocket on anterior side. **Parameres:** Left paramere elongate with medial portion of dorsoposterior margin slightly produced; posterior process straight with undulating lateral margin; anterior process small; long seta situated on anterior process. Right paramere with apical projection on posterior edge.

Female (pl. 8): Mean total length 3.36, mean pronotum width 0.94; differing from male as in generic description; antennal segment 2 more slender than in male.

Etymology: Named for the host genus *Hibbertia* (Dilleniaceae).

Hosts: Recorded from *Hibbertia cuneiformis* (pl. 33A) and *Hibbertia racemosa* (Dilleniaceae).

Distribution (map 7): Known from the south coast of Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Salmon Beach (headland), D'Entrecasteaux National Park, Windy Harbor, 34.81596°S 116.0076°E, 70 m, 03 Dec 1999, R.T. Schuh, G. Cassis and R. Silveira, *Hibbertia cuneiformis* (Labill.) Sm. (Dilleniaceae), det. PERTH staff PERTH 05670985, 1♂ (AMNH_PBI 00414414) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Cape Arid National Park, Thomas River

Campground, 33.8539°S 123.0126°E, 20 m, 24 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Hibbertia racemosa* Enol. (Dilleniaceae), det. PERTH staff PERTH 05670888, 1♂ (00414249), 2♀ (00414251, 00414252) (AM), 1♀ (00414250) (WAMP).

Eremotylus mosmanensis, new species
Figure 29, map 7, table 1, plates 8, 9

DIAGNOSIS: Recognized by the ovoid body form, pale-green coloration, and almost transparent hemelytron with a weak brown spot on corium at inner angle of cuneus and at apex of membrane cells (pl. 8). Endosoma twisted, weakly sigmoid, with a single short apical spine (fig. 29, pl. 9); left paramere relatively short, elevated at apex, posterior process nearly straight (fig. 29). Distinguished from other species of *Eremotylus* by the relatively small size, elongate ovoid shape, polished and shining dorsum, transparent hemelytron, blunt subapical aspect of the endosoma, and uniquely by the single, short, curved, apical spine.

DESCRIPTION: *MALE:* Mean total length 3.39, mean pronotum width 0.96. COLORATION (pl. 8): Light green, hemelytron largely transparent, corium with dark spot at inner angle of cuneus; membrane weakly fumose with a dark spot at apex of cells. SURFACE AND VESTITURE (pl. 8): Dorsum smooth, polished, and shining; vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 8): Short, vertex of moderately width, eyes moderately large, frons not or only weakly swollen and projecting anterior to eye, eye occupying two-thirds height of head; antennae inserted just above ventral margin of eye, eye weakly emarginate above insertion; antennal segment 2 relatively short and stout (0.75), 1.08 times width of head; labium reaching to apex of mesocoxa. **Thorax** (pl. 8): Mesoscutum broadly exposed. *Hemelytron*: Weakly elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (fig. 29, pl. 9): **Pygophore:** Broadly conical. **Endosoma:** Weakly sigmoid, ventral strap terminating proximal to secondary gonopore; dorsal strap extending distad of gonopore, bifid subapically with a single, short curved, apical spine and broad flat sclerite; secondary gonopore small circular. **Phallotheca:** Apical portion elongate conical, dorsal margin with very narrow crest, aperture with slightly undulating narrow margin, situated dorsally on anterior surface. **Parameres:** Left paramere small, compact; dorsoposterior margin broadly produced straight; posterior process short, straight; anterior process minute, rounded; long seta situated laterad of anterior process. Right paramere apically with small truncate point on posterior angle.

FEMALE (pl. 8): Mean total length 3.01, mean pronotum width 0.94; antennal segment 2 more slender than in male.

ETYMOLOGY: Named for Mosman Park, Perth, Western Australia, the type locality.

HOSTS: Recorded from *Eremophila glabra, Eremophila serrulata,* and *Myoporum platycarpum* (pl. 39F) (Scrophulariaceae).

DISTRIBUTION (map 7): The majority of specimens are from Mosman Park, Perth, Western Australia; specimens also examined from Ularring Rock in the Goldfields region of Western Australia and from the Gawler Ranges of South Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** Mosman Park, Perth, trail b/w Minum Cove Park and Chidley Point Reserve, 32.01573°S 115.7626°E, 15 m, 01 Aug 2005–03 Aug 2005, G. Cassis, *Eremophila glabra* (R. Br.) Ostenf. *albicans* (Scrophulariaceae), det. WA Herbarium PERTH 07621787, 1♂ (AMNH_PBI 00412704) (WAMP).

PARATYPES: **AUSTRALIA: South Australia:** Gawler Ranges National Park: ca. 3.7 km S of Pine Well, 32.37141°S 135.29219°E, 186 m, 16 Nov 2012, M. Cheng, G.S. Taylor, R. Kittel & D. McLaughlin, *Myoporum platycarpum* R. Br. (Scrophulariaceae), det. SA Herbarium BS838-915, 2♂ (00387441, 00387442) (UNSW). **Western Australia:** Credo Station, Ularring Rock, 29.92705°S 120.54988°E, 476 m, 08 Sep 2011, M. Cheng, C. Symonds & M. Jambrecina, *Eremophila serrulata* Druce (Scrophulariaceae), det. WA Herbarium MC088, 1♂ (UNSW_ENT 00024763) (AMNH), 3♂ (UNSW_ENT 00024759-UNSW_ENT 00024761), 1♀ (UNSW_ENT 00024765) (UNSW), 2♂ (UNSW_ENT 00024762, UNSW_ENT 00024764) (WAMP). Karara, small granite dome N of Emu Fence on track to Corner Well, 29.16352°S

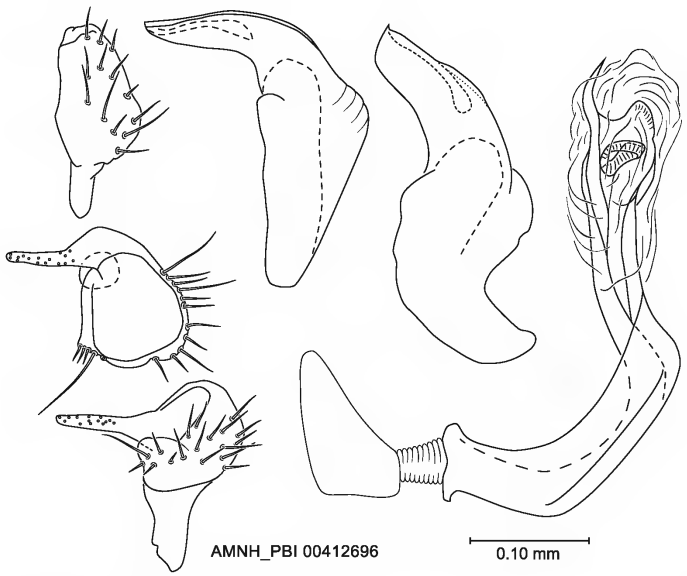


Fig. 29. Male genitalic structures of *Eremotylus mosmanensis*.

116.66597°E, 347 m, 20 Sep 2009, C. Symonds, *Eremophila serrulata* Druce (Scrophulariaceae), det. WA Herbarium, 1♂ (00387487) (UNSW). Mosman Park, Perth, trail b/w Minum Cove Park and Chidley Point Reserve, 32.01573°S 115.7626°E, 15 m, 01 Aug 2005–03 Aug 2005, G. Cassis, *Eremophila glabra* (R. Br.) Ostenf. (Scrophulariaceae), det. WA Herbarium PERTH 07621787, 14♂ (00412682–00412687, 00412689, 00412690, 00389777–00389782), 11♀ (00412718, 00412720–00412724, 00412726, 00412728, 00412730, 00389783, 00389784), 14♂ (00412682–00412687, 00412689, 00412690, 00389777–00389782), 11♀ (00412718, 00412720–00412724, 00412726, 00412728, 00412730, 00389783, 00389784) (AM), 10♂ (00412688, 00412694, 00412696–00412703), 13♀ (00412731, 00412736, 00412739–00412745, 00412719, 00412725, 00412727, 00412729) (AMNH), 4♂ (00412691–00412693, 00412695), 6♀ (00412732–00412735, 00412737, 00412738) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** Mosman Park, Perth, trail b/w Minum Cove Park and Chidley Point Reserve, 32.01573°S 115.7626°E, 15 m, 01 Aug 2005–03 Aug 2005, G. Cassis, *Eremophila glabra* (R. Br.) Ostenf. *albicans* (Scrophulariaceae), det. WA Herbarium PERTH 07621787, 2 adults sex unknown (00412705, 00412706), 11 nymphs (00412707–00412717) (AM).

Eremotylus stuarti, new species
Figure 30, map 7, table 1, plates 8, 9, 44

Diagnosis: Recognized by the moderate size (mean length 3.08), elongate oval body, translucent hemelytron, and uniform green coloration in living specimens (pl. 8). Endosoma moderately elongate, almost U-shaped, weakly twisted, with one long, straight, erect broad spine and two short, slender spines subtending the secondary gonopore (fig. 30); left paramere with a distinctly undulating posterior process (fig. 20). Easily confused with *E. glaber* on the basis of size, coloration, and genitalic structure, but that species with long apical spine at a right angle to distal third of endosoma and one short spine arising at distal edge of gonopore rather than subtending it; posterior process of left paramere undulating as in *E. betoota* and *E. glaber*.

Description: *Male:* Mean total length 3.08, mean pronotum width 0.89. COLORATION (pl. 8): Light green in life, changing to weakly yellow when preserved, hemelytron almost opaque; membrane pale to weakly fumose. SURFACE AND VESTITURE (pl. 8): Dorsum smooth, weakly shining; vestiture of reclining, dark, common setae.

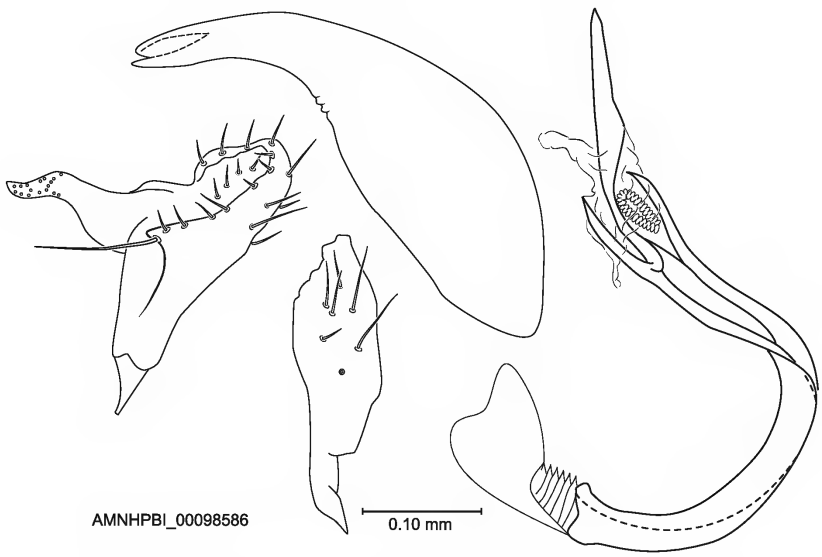


Fig. 30. Male genitalic structures of *Eremotylus stuarti*.

STRUCTURE: **Head** (pl. 8): Short, moderately broad, eyes of moderate size, frons not or only weakly swollen and only slightly projecting anterior to eye, eye occupying slightly less than two-thirds height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate at and above insertion; antennal segment 2 moderately long and stout (0.91), not noticeably swollen, 1.36 times width of head; labium somewhat surpassing posterior margin of mesosternum. **Thorax** (pl. 8): Mesoscutum narrowly exposed. *Hemelytron*: Weakly elongate, costal margin very weakly convex, cuneus weakly elongate. GENITALIA (fig. 30, pl. 9): **Pygophore:** Elongate conical, dorsal surface anteriad of aperture with narrow tubercle on left side; single long bristle anteroventrad of each paramere insertion. **Endosoma:** Region distad of secondary gonopore strongly bent to left; dorsal strap bifid proximal of secondary gonopore, apically with one short, slender, erect spine and one long, straight spine; ventral strap terminating in subapical point subtending secondary gonopore. **Phallotheca:** Apical portion narrow, dorsal margin without crest, aperture narrow slitlike, situated on anterodorsal margin and continuous across apex. **Parameres:** Left paramere elongate with medial portion of dorsoposterior margin produced; posterior process bent with undulating lateral margin; anterior process minute, pointed; long seta situated on anterior process. Right paramere narrowed apically, apex with three small points.

Female (pl. 8): Mean total length 2.78, mean pronotum width 0.89; antennal segment 2 more slender than in male. GENITALIA as in plate 44.

Etymology: Named after John McDouall Stuart, Central Australian explorer.

Host: Recorded from *Eremophila macdonnellii* (Scrophulariaceae).

Distribution (map 7): Known from the Alice Springs region of Central Australia.

Holotype: **AUSTRALIA: Northern Territory:** 13.5 km E of Stuart Hiway on Horseshoe Bend Rd, 25.13334°S 133.2999°E, 464 m, 28 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila macdonnellii* F. Muell. (Scrophulariaceae), det. NSW staff NSW658390, 1♂ (AMNH_PBI 00098587) (MNT).

Paratypes: **AUSTRALIA: Northern Territory:** 13.5 km E of Stuart Hiway on Horseshoe Bend Rd, 25.13334°S 133.2999°E, 464 m, 28 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila macdonnellii* F. Muell. (Scrophulariaceae), det. NSW staff NSW658390, 5♂ (00098562–00098564, 00391056, 00391057), 9♀

(00098565, 00098567, 00098575–00098578, 00098580, 00098582, 00098589) (AM), 9♀ (00098566, 00098569, 00098571–00098573, 00098579, 00098581, 00097164, 00098588), 4♂ (00098583–00098586) (AMNH), 2♀ (00098574, 00097163) (MNT).

Grandivesica, new genus

TYPE SPECIES: *Grandivesica pilbara,* new species.

DIAGNOSIS: Recognized by the short, stout, sometimes sigmoid endosoma, apex of endosoma sometimes with foliaceous, plate like elaborations or with a terminal membranous bag devoid of microtrichia (figs. 32–36, pl. 11; phallotheca usually with a distinct crest on dorsodistal margin (figs. 32–36); body ranging from small to moderate size; coloration pale, yellowish, or green, usually with contrasting dark spot at inner angle of cuneus (pl. 10). Most easily confused with *Eremotylus, Gyrophallus, Omniviriphylus,* and *Spinivesica* on the basis of pale coloration and dark spot on corium at inner angle of cuneus, but *Grandivesica* (except *G. cassisi*) lacking additional dark spot at apex of membrane cells seen in many species placed in those genera. Stout endosoma virtually unique within Australian Cremnorrhinina, although possibly confused with the relatively short and stout endosoma in *Halophylus, Proteophylus*, and *Pulvillophylus*, but those taxa always with distinct, usually paired, apical spines of forms unlike the conditions seen in *Grandivesica.*

DESCRIPTION: *MALE*: Total length 2.41–4.06, pronotum width 0.83–1.27. COLORATION (pl. 10): Pale, yellowish, or green, including all appendages; corium usually with infuscate mark adjacent to inner angle of cuneus. SURFACE AND VESTITURE (fig. 31A–C, pl. 10): Dorsum smooth, polished and weakly to moderately shining. Dorsum clothed with recumbent simple or scimitar-shaped setae, usually pale, sometimes dark. STRUCTURE: **Head** (fig. 31A, pl. 10): Short, transverse; frons at most weakly surpassing anterior margin of eyes; eyes moderately large, weakly bulging, confluent with anterior margin of pronotum; eyes in lateral view occupying about two-thirds height of head; antennal segment 2 relatively short, ranging from 0.92–1.09 times width of head, either stout and parallel sided or weakly tapered proximally; antenna inserted at nearly ventral margin of eye. **Thorax** (fig. 31A–C, pl. 10): Pronotum with lateral margins nearly straight to weakly convex, anterior lobe short, calli weakly demarcated along posterior margin, posterior lobe at most weakly elevated, posterior margin straight to weakly concave, with rounded humeral angles; mesoscutum weakly to broadly exposed; scutellum triangular, flat. Pretarsus as in figure 31E, F. *Hemelytron*: Short to weakly elongate, corial margin nearly straight to moderately convex. GENITALIA (figs. 31D, 32–36, pl. 11): **Pygophore:** Broadly conical, left margin of aperture slightly raised, with row of bristles; dorsal surface usually without tubercles or patches of bristles; rarely with pair of blunt tubercles on either side of dorsal surface anteriad of aperture. **Endosoma:** Variable; J-shaped, short and stout with dorsal strap variably reduced and ventral strap predominate and strongly curved to left with variable terminal spines; or sigmoid with variable distal spines; apex sometimes with foliaceous, platelike elaborations or with a terminal ribbonlike sclerite supporting billowy membranous bag with microtrichia; secondary gonopore large, well sclerotized, subapical or practically apical. **Phallotheca:** Apical portion well sclerotized, roughly conical, dorsal surface with variable crest, aperture usually placed on anterior dorsoapical aspect reaching to and ventrad of apex, margin undulating, large and wide; basal portion reaching to middle of ventral surface of pygophore in situ. **Parameres:** Left paramere with straight dorsoposterior margin not significantly elevated above posterior and anterior processes; size usually large, elongate; sometimes relatively small with typical phyline shape; posterior process relatively long and straight, lateral margin undulating; anterior process usually large and rounded apically, sometimes short and placed medially on anterior margin; prominent seta placed laterally or on anterior process. Right paramere moderately large to large, broad across dorsal aspect; apical margin with one more or less distinct, usually short, projection.

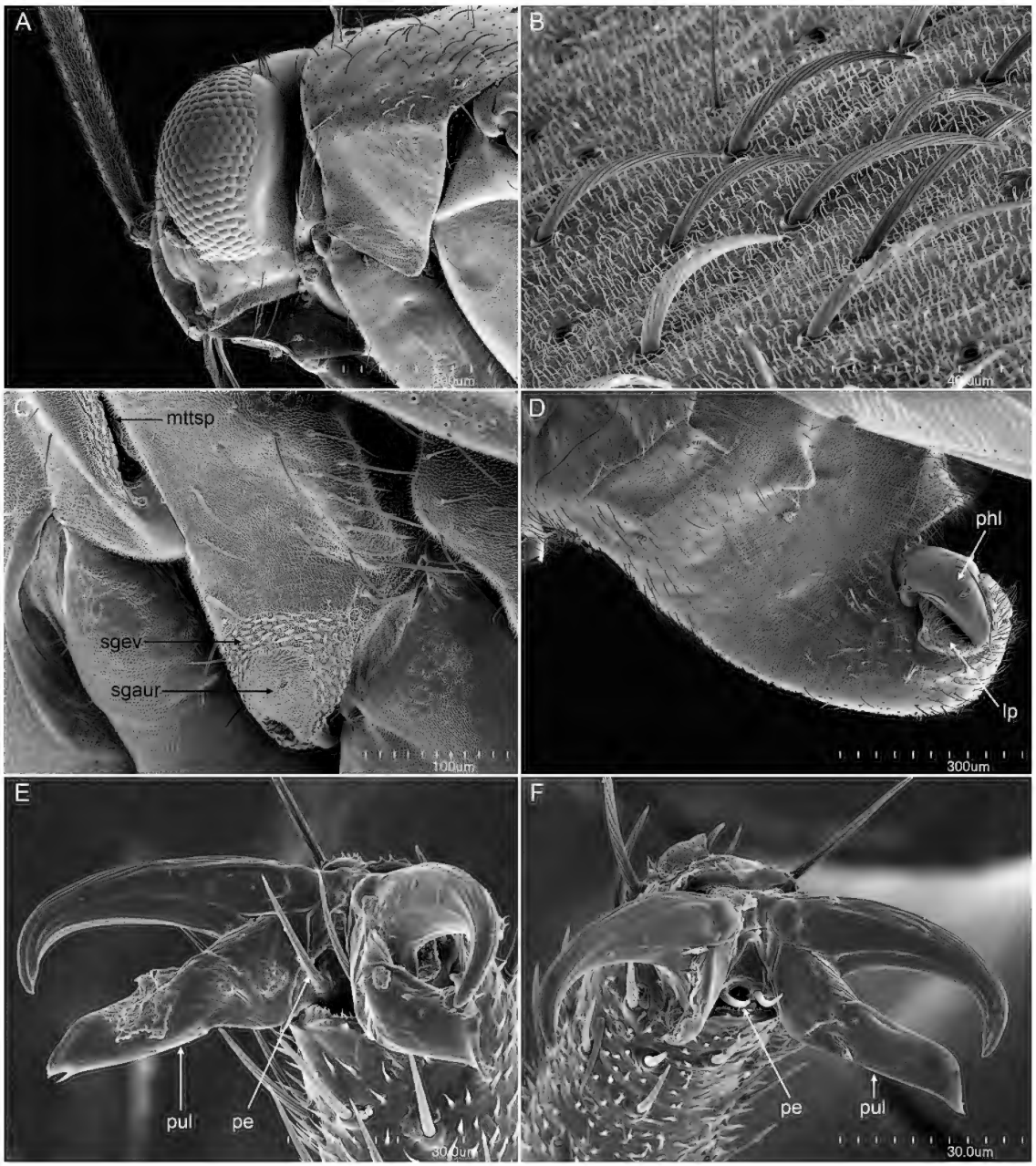
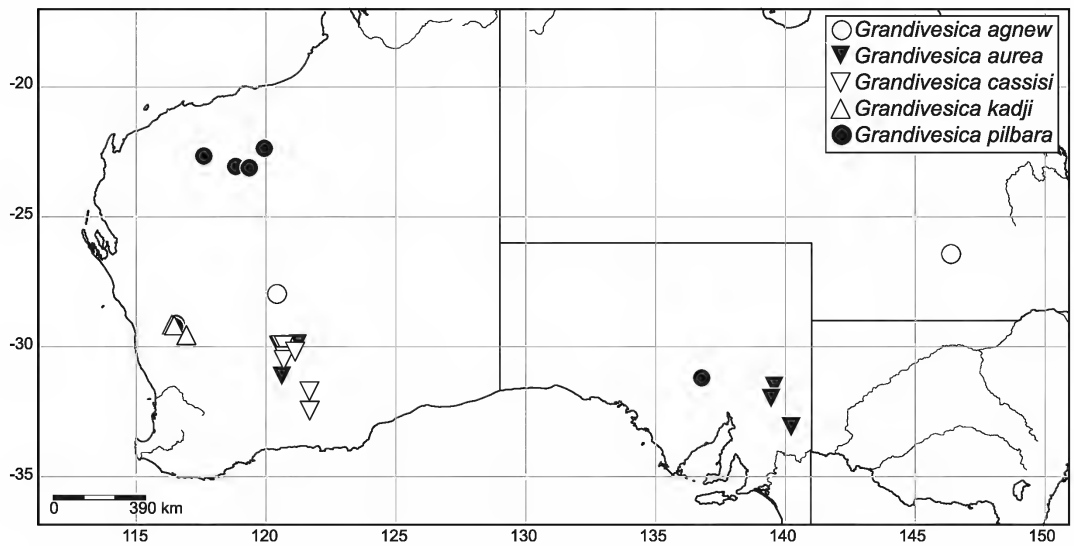


Fig. 31. *Grandivesica cassisi*. Scanning electron micrographs. **A.** Lateral view of head, showing structural details common to most Australian Cremnorrhinina. **B**. Detail of pronotal setae. **C.** Thoracic pleuron, showing metathoracic spiracle opening, metathoracic scent-gland auricle, and evaporatory area. **D.** Lateroventral view of pygophore. **E.** Lateroventral view of pretarsus. **F**. Frontal view of pretarsus. Abbreviations: **lp,** left paramere; **mttsp**, metathoracic spiracle; **pe**, parempodium; **phl**, phallotheca; **pul**, pulvillus; **sgaur,** scent gland auricle; **sgev,** scent gland evaporatory area.



Map 8. Distribution of *Grandivesica* spp.

Female (pl. 10): Coloration and structure similar to male; total length 2.52–3.92, pronotum width 0.87–1.24. Costal margin more noticeably convex than in male; antennal segment 2 more slender and tapering proximally. GENITALIA (pl. 45): **Vestibular sclerites:** Large, attaining anterior edge of sclerotized rings. *First gonapophyses*: Relatively small, narrow basal blocks. *Ventral labiate plate*: Platelike medial anteroventral extension wider than lateral extent of basal gonapophysal structures, anterior surface undulate, covering anterior surface of basal structures. **Dorsal labiate plate:** Large; long longitudinally; seminal receptacle sometimes long, thickly membranous. *Sclerotized rings*: Large, subtriangular or subovoid, relatively flat, thick walled, medial angle sometimes attenuate. *Posteromedial region*: Surface with conspicuous microstructure. *Anterolateral region*: Anterior margin extending beyond anterior edge of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Not differentiated from connecting membrane. *Interramal sclerites*: Moderately sclerotized, lateral sclerites wedge shaped, medial sclerite broadly triangular.

Etymology: From the Latin, *grandis*, "large," and *vesica*, in reference to the robust structure of the endosoma; feminine.

Discussion: The endosoma in *Grandivesica* spp. is large and heavily sclerotized even though the size of the insects themselves is usually small, *G. kadji* being the largest species. The structure of the endosoma and associated male genitalic structures shows substantial morphological variation.

Grandivesica agnew, new species
Figure 32, map 8, table 1, plates 10, 11

Diagnosis: Recognized by the relatively small size, green or yellow coloration, intense dark marking on corium at inner angle of cuneus (pl. 10); sigmoid endosoma with large, flat, serrate sclerite, and relatively long curved spine subtended by a small smooth plate just apicad of secondary gonopore (figs. 32–36, pl. 11). Similar to *G. aurea* on sigmoid endosoma, but in contrast to *G. agnew* endosoma in that species with a smooth sclerite and laterally placed apical spine, phallotheca with a large crest, and anterior process of left paramere smaller and more medially placed on the anterior margin.

Description: *Male:* Mean total length 2.77, mean pronotum width 0.88. COLORATION (pl. 10): Light green to yellow, hemelytron translucent, corium with an intense dark spot at inner angle of cuneus; membrane at most weakly fumose, without a dark spot at apex

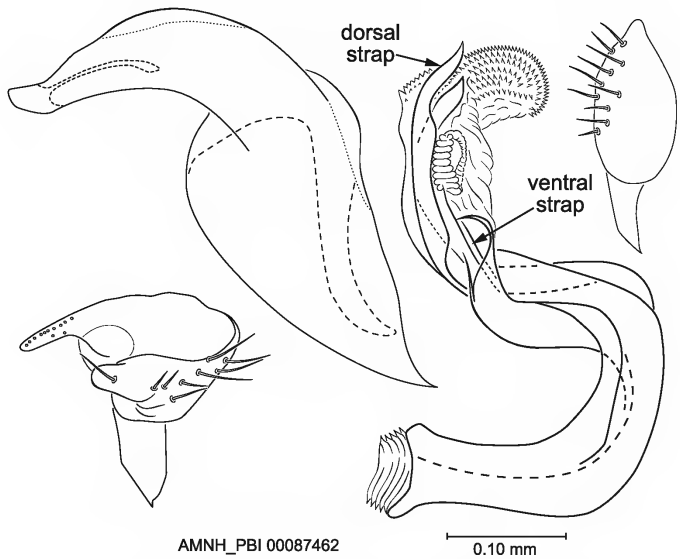


Fig. 32. Male genitalic structures of *Grandivesica agnew*.

of cells. SURFACE AND VESTITURE (pl. 10): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 10): Eye occupying one-half height of head in lateral view; antenna inserted just above ventral margin of eye, eye very weakly emarginate, antennal segment 2 short (0.61), weakly tapering proximally, 0.92 times width of head; labium exceeding apex of metacoxa and reaching onto abdomen. **Thorax** (pl. 10): Mesoscutum narrowly exposed. *Hemelytron*: Weakly elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (fig. 32, pl. 11): **Pygophore:** As in generic description. **Endosoma:** Sigmoid, ventral strap terminating in faint hoop-shaped sclerite proximal of secondary gonopore; dorsal strap apically bifid with wide, flattened, serrate, ventrally directed sclerite and stout curved spine subtended by small smooth plate; secondary gonopore subapical, situated within interstrap membrane, gonopore with small, narrow, subtending sclerite. **Phallotheca:** Apical portion with small crest on dorsal surface; aperture situated on left dorsoapical aspect with moderately wide, elongate undulating margin; apex upturned. **Parameres:** Left paramere relatively small, typically phyline. Right paramere moderately large, lanceolate, apex moderately attenuate with medial projection.

Female (pl. 10): Coloration as in male; differing from male as in generic description; mean total length 2.82, mean pronotum width 0.91.

Etymology: Named after the Western Australian town of Agnew, near the type locality; a noun in apposition.

Hosts: Recorded from *Eremophila freelingii* (pl. 37H, I) and *E. platythamnos* (pl. 38H) (Scrophulariaceae).

Distribution (map 8): Known from near Agnew in the Goldfields Region of Western Australia and from near Charleville in south-central Queensland.

Holotype: **AUSTRALIA: Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427507, 1♂ (AMNH_PBI 00389075) (QM).

Paratypes: **AUSTRALIA: Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, 2♂ (00389729, 00389730) *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427507, 13♂ (00389073, 00389074, 00389076–00389085, 00087462), 7♀ (00389091–00389097) (AM), 12♂ (00130347, 00130348, 00130350, 00130351, 00130349, 00130561,

00130562, 00131413–00131417), 27♀ (00130352–00130363, 00413063, 00130563–00130573, 00131418–00131420) (AMNH), 1♀ (00389731), 4♂ (00389086–00389089), 4♀ (00389098–00389101) (QM). **Western Australia:** 31.7 km W of Agnew toward Sandstone, 27.96227°S 120.4277°E, 800 m, 26 Oct 1996, Schuh and Cassis, *Eremophila platythamnos* Diels *platythamnos* (Scrophulariaceae), det. PERTH staff PERTH 05054664, 4♂ (00389061–00389063, 00087200), 5♀ (00389066–00389068, 00389071, 00087201) (AM), 5♂ (00135262–00135264, 00135266, 00135267), 14♀ (00135269–00135282) (AMNH), 4♂ (00135261, 00135265, 00135268, 00389064), 4♀ (00135283, 00135284, 00389069, 00389070), 4♂ (00135261, 00135265, 00135268, 00389064), 4♀ (00135283, 00135284, 00389069, 00389070) (WAMP).

Other Specimens Examined: **AUSTRALIA: Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427507, 1 nymph (00389090) (QM). **Western Australia:** 31.7 km W of Agnew toward Sandstone, 27.96227°S 120.4277°E, 800 m, 26 Oct 1996, Schuh and Cassis, *Eremophila platythamnos* Diels *platythamnos* (Scrophulariaceae), det. PERTH staff PERTH 05054664, 1 nymph (00389065) (AM).

Grandivesica aurea, new species
Figure 33, map 8, table 1, plates 10, 11, 45A–C

Diagnosis: Recognized by light green to yellow coloration, absence of a dark marking on the corium at the inner angle of the cuneus (pl. 10); sigmoid endosoma with large, flat, smooth, marginally concave sclerite and short spine just apicad of secondary gonopore (fig. 33, pl. 11), and phallotheca with large dorsal crest (fig. 33). Similar to *G. agnew* on basis of sigmoid endosoma, but that species with apical sclerite of endosoma smooth, dorsal crest of phallotheca small, right paramere lanceolate with a medial apical projection, and corium with an intense dark spot adjacent to inner angle of cuneus.

Description: *Male:* Mean total length 3.29, mean pronotum width 1.00. COLORATION (pl. 10): Light green to yellow, hemelytron translucent, without a dark spot at inner angle of cuneus; membrane at most weakly fumose, without a dark spot at apex of cells. SURFACE AND VESTITURE (pl. 10): Vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 10): Eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate at insertion; antennal segment 2 relatively short (0.74), weakly tapering proximally, 1.07 times width of head; labium reaching to posterior margin of mesosternum. **Thorax** (pl. 10): Mesoscutum narrowly exposed. *Hemelytron*: Weakly elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (fig. 33, pl. 11): **Pygophore:** As in generic description. **Endosoma:** Sigmoid, ventral strap with medial section wide and twisted, terminating in large, flattened, well-sclerotized hoop-shaped sclerite surrounding proximal edge of secondary gonopore; dorsal strap apically bifid with gently curved spine with upturned apex and moderately large smooth sclerotized plate with recurved distal margin; secondary gonopore subapical, situated within interstrap membrane, apical sclerotized extension, surface dorsad of gonopore with small spine. **Phallotheca:** Apical portion with very large crest on dorsal surface; aperture on anterior dorsoapical aspect with wide, elongate undulating margin. **Parameres:** Left paramere elongate, posterior process long, and anterior process short, pointed, placed medially on anterior margin. Right paramere large, apex somewhat truncate with an irregular projection on posterior angle and another smaller medial point.

Female (pl. 10): Coloration as in male; differing from male as in generic description; mean total length 3.14, mean pronotum width 1.00. GENITALIA: As in plate 45A–C.

Etymology: From the Latin, *aureus*, "gold," in reference to the coloration of this taxon.

Hosts: Recorded from *Eremophila caperata* (pl. 37A–C), *E. platythamnos* (pl. 38H), and *E. sturtii* (pl. 39C–E) (Scrophulariaceae).

Distribution (map 8): Known from western New South Wales and from the Goldfields region of Western Australia.

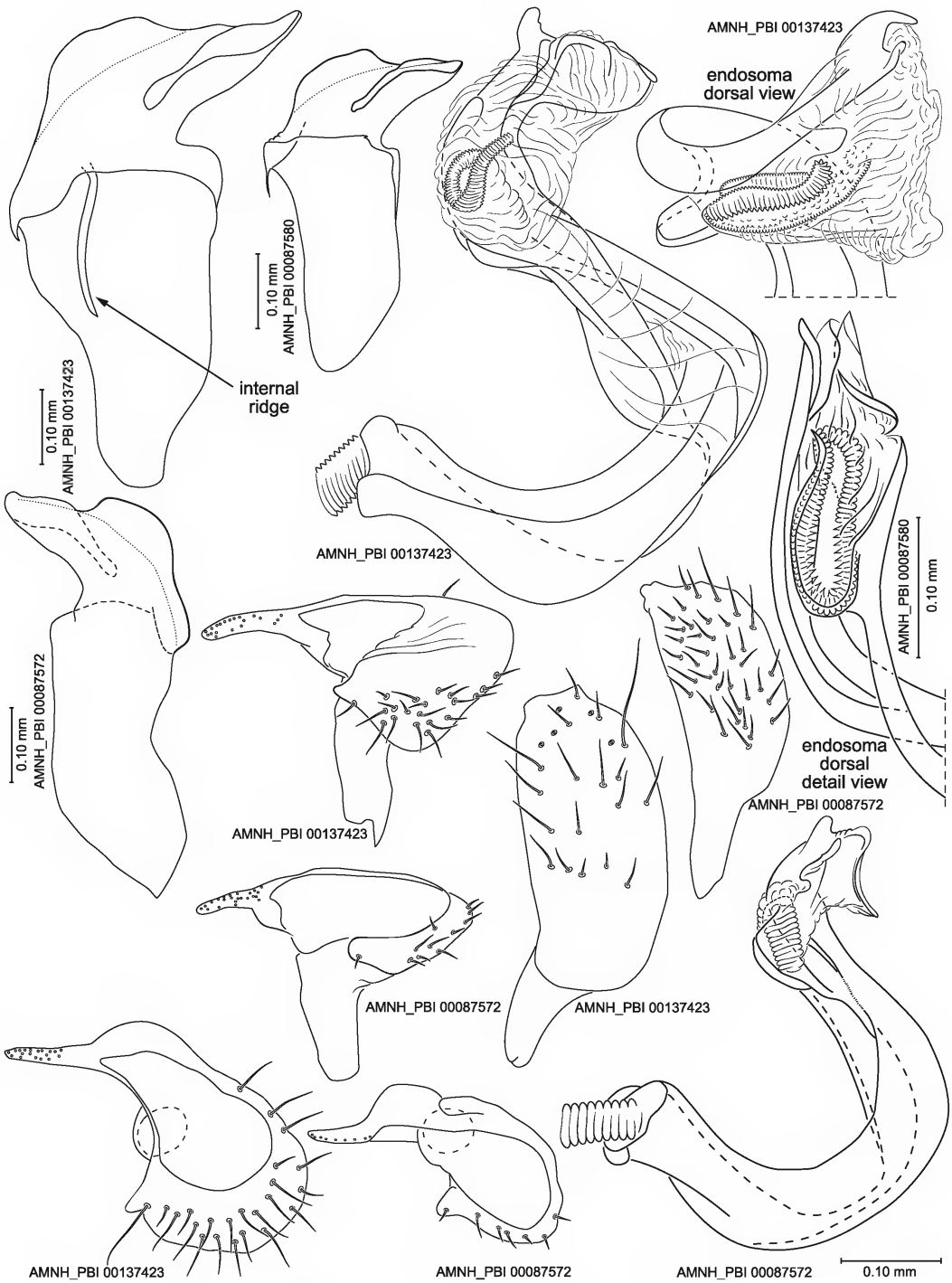


Fig. 33. Male genitalic structures of *Grandivesica aurea*.

HOLOTYPE: **AUSTRALIA: Western Australia:** 60 km W of Coolgardie on Great Eastern Hiway, 31.14334°S 120.6159°E, 350 m, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila caperata ms* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05670446, 1♂ (AMNH_PBI 00087399) (WAMP).

PARATYPES: **AUSTRALIA: South Australia:** 10.3 km W of Quondong Vale, 33.1137°S 140.2231°E, 100 m, 08 Nov 1996, Schuh and Cassis, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05236592, 1♂ (00137423) (AMNH). 14.3 km S of Erudina Woolshed, 31.53334°S 139.5506°E, 86 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♂ (00413055) (AM). 72 km N of Yunta, Nillinghoo Creek, 32.00924°S 139.4523°E, 194 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. Royal Botanic Garden NSW 666375, 2♂ (00413052, 00413054) (AMNH). **Western Australia:** 60 km W of Coolgardie on Great Eastern Hiway, 31.14334°S 120.6159°E, 350 m, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05670446, 1♂ (00388806), 1♀ (00388809) (AM), 2♀ (00388808, 00087400), 1♂ (00087572) (AMNH), 1♀ (00388810) (WAMP). ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05099994, 4♂ (00388813, 00388815–00388817), 3♀ (00388822–00388824) (AM), 2♂ (00388814, 00087580), 2♀ (00087422, 00392824) (AMNH), 3♂ (00388811, 00388812, 00087421), 2♀ (00388820, 00388821) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** 60 km W of Coolgardie on Great Eastern Hiway, 31.14334°S 120.6159°E, 350 m, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05670446, 1 nymph (00388807) (AM). ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05099994, 2 nymphs (00388818, 00388819) (AM).

Grandivesica cassisi, new species
Figures 31, 34, map 8, table 1, plates 10, 11, 45E

DIAGNOSIS: Recognized by light green to yellow coloration, stout antennal segment 2 in male, weak dark spot on corium at inner angle of cuneus, weak dark marking on membrane at apex of cells (pl. 10), J-shaped endosoma with medial secondary gonopore situated on dorsal surface and with three roughly parallel ribbonlike sclerites supporting extensive membranous bags devoid of microtrichia apically, and small membranous sac with an apical sclerite opposite secondary gonopore proximad of terminal structures (fig. 34, pl. 11). Similar to *G. kadji* and *G. pilbara* on the basis of J-shaped endosoma, but secondary gonopore in those species nearer to apex when compared to medial placement in *G. cassisi*, and both those species lacking the additional membranous sac opposite the secondary gonopore as seen in *G. cassisi*.

DESCRIPTION: *Male:* Mean total length 3.14, mean pronotum width 0.93. COLORATION (pl. 10): Light green to yellow, hemelytron translucent, corium with a weak dark spot at inner angle of cuneus; membrane at most weakly fumose, with a weak dark spot at apex of cells. SURFACE AND VESTITURE (fig. 31B, pl. 10): Vestiture of reclining, dark, common setae. STRUCTURE: **Head** (fig. 31A, pl. 10): Eye occupying about three-fifths height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate; antennal segment 2 relatively short (0.72), very weakly enlarged, of uniform diameter, 1.09 times width of head; labium just surpassing posterior margin of mesosternum. **Thorax** (fig. 31C, pl. 10): Mesoscutum narrowly exposed. Thoracic pleuron as in figure 31C. Pretarsus as in figure 31E, F. *Hemelytron*: Weakly elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (figs. 31D, 34, pl. 11): **Pygophore:** Dorsal surface with pair of blunt tubercles, left tubercle larger than right. **Endosoma:** J-shaped, stout; ventral strap reduced to narrow subtending sclerite of secondary gonopore and a strong sclerite cradling right margin of gonopore; dorsal strap wide, tilted on dorsoventral axis proximal of secondary gonopore, distad of gonopore strongly divided into three

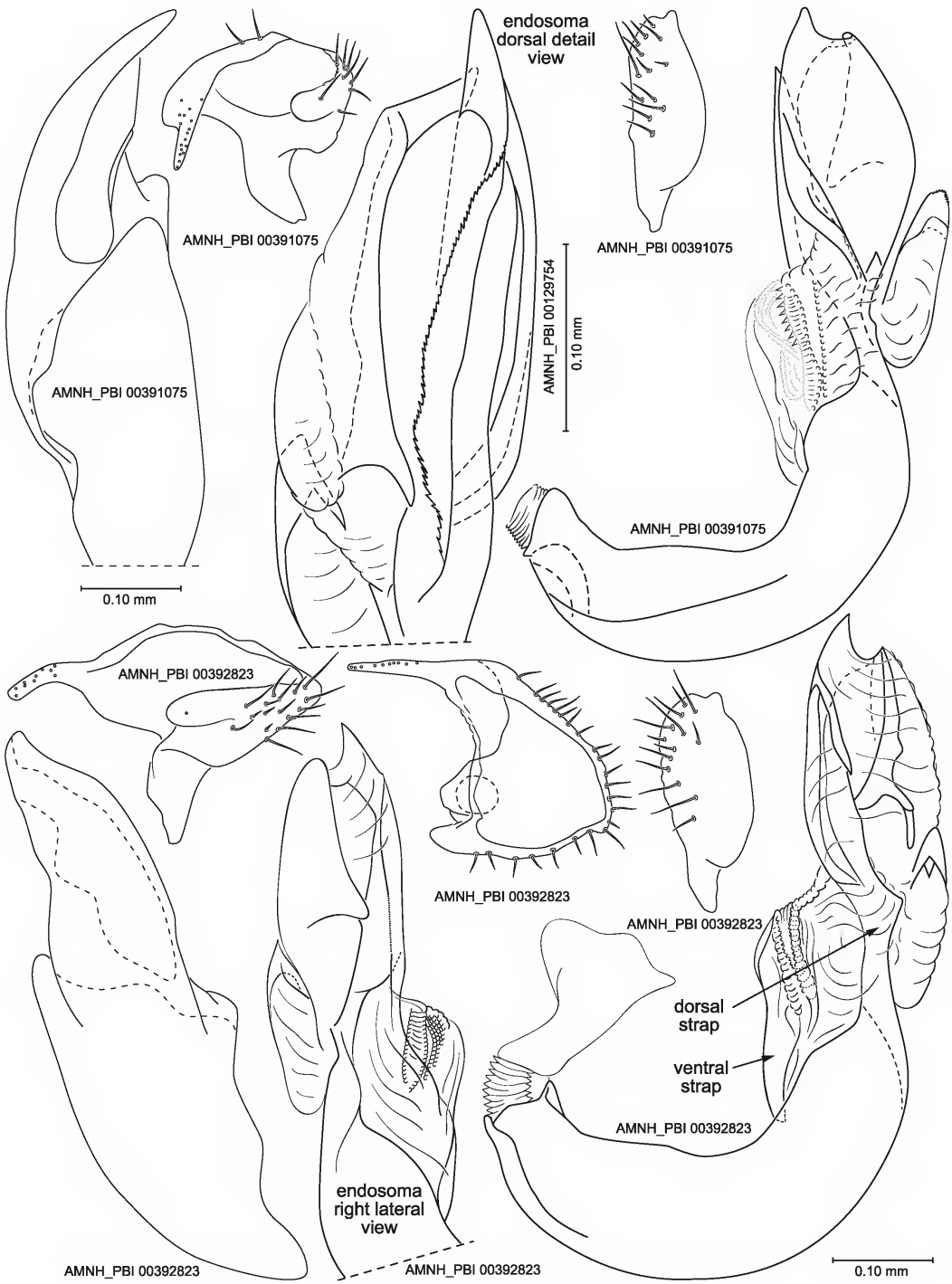


Fig. 34. Male genitalic structures of *Grandivesica cassisi*.

mostly parallel ribbonlike sclerites supporting billowy membrane, middle sclerite with short apical prominence; small sclerite supporting small membranous bag at level of gonopore; secondary gonopore medial. **Phallotheca:** Apical portion without crest on dorsal surface, but right margin of aperture raised; aperture on anterior dorsoapical aspect, very large with undulating margin, reaching apex as wide opening. **Parameres:** Left paramere elongate with posterior process long and anterior process large, rounded apically. Right paramere moderately large with apical spine medially placed on asymmetrical margin.

Female (pl. 10): Coloration as in male; differing from male as in generic description; mean total length 3.18, mean pronotum width 0.97. GENITALIA: As in plate 45E.

ETYMOLOGY: Named after Gerasimos Cassis, in recognition of his collections of this species as well as many other Australian Cremnorrhinina.

HOSTS: Recorded from *Eremophila caperata* (pl. 37A–C), *E. decipiens*, *E. dempsteri* (pl. 37F), *E. interstans*, and *Eremophila* sp. (Scrophulariaceae).

DISTRIBUTION (map 8): Known from the Coolgardie region of south-central Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** 49 km S of Kambalda Road Jct. on Coolgardie-Esperance Hiway, 31.7171°S 121.6906°E, 300 m, 19 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila dempsteri* F. Muell. (Scrophulariaceae), det. Field ID, 1♂ (AMNH_PBI 00129377) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 33.3 km S of Norseman, 32.46461°S 121.6778°E, 300 m, 19 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila dempsteri* F. Muell. (Scrophulariaceae), det. WA Herbarium PERTH 05672368, 7♂ (00389102–00389108), 6♀ (00389115–00389119, 00389122) (AM), 2♂ (00389109, 00389110), 2♀ (00389120, 00389121) (WAMP). 49 km S of Kambalda Road Jct. on Coolgardie-Esperance Hiway, 31.7171°S 121.6906°E, 300 m, 19 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila dempsteri* F. Muell. (Scrophulariaceae), det. Field ID, 15♂ (00391075, 00391076, 00391078, 00389580–00389591), 24♀ (00389597–00389619, 00389625) (AM), 23♂ (00129375, 00129376, 00129378–00129382, 00129745–00129752, 00129359–00129363, 00099395, 00129753, 00129754), 54♀ (00129383–00129393, 00129755–00129778, 00129791–00129796, 00129364–00129373, 00099396, 00129779, 00129780) (AMNH), 1♂ (00389594), 1♀ (00389624) (ANIC), 1♂ (00389593), 2♀ (00389622, 00389623) (CNC), 1♂ (00389595), 2♀ (00389626, 00389627) (USNM), 5♀ (00129781–00129785), 6♂ (00129786–00129790, 00389596) (WAMP), 1♂ (00389592), 2♀ (00389620, 00389621) (ZISP). 57 km S of Menzies, 30.16817°S 121.1633°E, 18 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila* sp. (Scrophulariaceae), det. PERTH staff PERTH 05612624, 1♀ (00389572), 1♂ (00087533) (AM), 1♂ (00129549) (AMNH). 60 km W of Coolgardie on Great Eastern Hiway, 31.14334°S 120.6159°E, 350 m, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05670446, 5♂ (00389168–00389171, 00391077), 11♀ (00389174–00389184) (AM), 12♂ (00129474–00129477, 00129485–00129492), 18♀ (00129478–00129484, 00129493–00129503) (AMNH), 1♂ (00389172) (WAMP). Credo Station, Coolgardie Nth Rd, 21 km N of homestead, 30.30766°S 120.68908°E, 467 m, 05 Sep 2011, M. Cheng & C. Symonds, *Eremophila interstans* Diels (Scrophulariaceae), det. WA Herbarium MC051, 11♀ (UNSW_ENT 00024678, UNSW_ENT 00024680–UNSW_ENT 00024689), 3♂ (UNSW_ENT 00024721–UNSW_ENT 00024723) (UNSW). Credo Station, Davyhurst Cemetery, 30.0625°S 120.64611°E, 06 Sep 2011, G.S. Taylor, *Eremophila* sp. (Scrophulariaceae), 1♂ (UNSW_ENT 00024735) (UNSW), 2♂ (UNSW_ENT 00024736, UNSW_ENT 00024737) (WAMP). Credo Station, Davyshurst Cemetery, 30.06261°S 120.64638°E, 467 m, 06 Sep 2011, M. Cheng, C. Symonds, & G.S. Taylor, *Eremophila interstans* Diels *virgata* (Scrophulariaceae), det. WA Herbarium MC053, 1♀ (UNSW_ENT 00024708), 9♂ (UNSW_ENT 00024724–UNSW_ENT 00024732) (UNSW), 6♀ (UNSW_ENT 00024709–UNSW_ENT 00024714) (WAMP). Credo Station, Reptile Dam, 30.53772°S 120.71036°E, 454 m, 31 Aug 2011, M. Cheng, *Eremophila interstans* Diels (Scrophulariaceae), det. WA Herbarium MC007, 12♀ (UNSW_ENT 00024690–UNSW_ENT 00024701), 4♂ (UNSW_ENT 00024717–UNSW_ENT 00024720) (UNSW). Credo Station, Ularring Rock, 29.92613°S 120.55072°E, 501 m, 04 Sep 2011, M. Cheng, R. Kittel & C. Levy, 2♀ (UNSW_ENT 00024706, UNSW_ENT

00024707) (UNSW). Credo Station, just off Coolgardie Nth rd, nr track that leads to Turkey Flat Dam, 30.3873°S 120.76163°E, 443 m, 03 Sep 2011, M. Cheng, *Eremophila interstans* Diels (Scrophulariaceae), det. WA Herbarium MC023, 4♀ (UNSW_ENT 00024702–UNSW_ENT 00024705) (UNSW). Credo Station, rd to Ularring Soak, 29.99602°S 120.55927°E, 487 m, 08 Sep 2011, M. Cheng, C. Symonds & M. Jambrecina, *Eremophila decipiens* Ostenf. *decipiens* (Scrophulariaceae), det. WA Herbarium MC093, 1♂ (UNSW_ENT 00024734) (UNSW). ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05099994, 1♂ (00392823) (AMNH).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 33.3 km S of Norseman, 32.46461°S 121.6778°E, 300 m, 19 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Eremophila dempsteri* F. Muell. (Scrophulariaceae), det. WA Herbarium PERTH 05672368, 4 nymphs (00389111–00389114) (AM). 49 km S of Kambalda Road Jct. on Coolgardie-Esperance Hiway, 31.7171°S 121.6906°E, 300 m, 19 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila dempsteri* F. Muell. (Scrophulariaceae), det. Field ID, 2 nymphs (00389628, 00389629) (AM), 5 nymphs (00129394–00129398) (AMNH). 60 km W of Coolgardie on Great Eastern Hiway, 31.14334°S 120.6159°E, 350 m, 17 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05670446, 1 nymph (00389173) (AM), 1nymph (00412296) (AMNH) Credo Station, Davyshurst Cemetery, 30.062616S 120.646386E, 467 m, 06 Sep 2011, M. Cheng, C. Symonds, & G.S. Taylor, *Eremophila interstans* Diels *virgata* (Scrophulariaceae), det. WA Herbarium MC053, 1 nymph (UNSW_ENT 00024733) (UNSW).

Grandivesica kadji, new species
Figure 35, map 8, table 1, plates 10, 11

Diagnosis: Recognized by the large size, patterned beige and pale coloration of the dorsum, and robust antennal segment 2 (pl. 10); endosoma J-shaped, secondary gonopore subapical and perpendicular within the interstrap region, apically with a convoluted sclerite with two short, rounded apical spines supporting a very extensive membranous bag devoid of microtrichia (fig. 35, pl. 11). Similar to *G. cassisi* and *G. pilbara* on basis of J-shaped endosoma, but secondary gonopore in former species located medially on dorsal surface; in latter species, as well as in *G. kadji*, secondary gonopore subapical, transverse, and within interstrap region of endosoma; *G. kadji* further distinguished from *G. pilbara* by extensive membranous sac and two short apical spines of endosoma, strong dorsal crest of the phallotheca, and large anterior process of left paramere.

Description: *Male*: Mean total length 3.82, mean pronotum width 1.20. COLORATION (pl. 10): Intermixed pattern of beige and pale on dorsum, hemelytron translucent, corium with heavy dark spot at inner angle of cuneus; membrane weakly fumose, without dark spot at apex of cells. SURFACE AND VESTITURE (pl. 10): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 10): Eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate; antennal segment 2 short and thick (0.63), 0.79 times width of head; labium reaching posterior margin of mesosternum. **Thorax** (pl. 10): Mesoscutum broadly exposed. *Hemelytron*: Weakly elongate, costal margin nearly straight, cuneus relatively short. GENITALIA (fig. 35, pl. 11): **Pygophore:** As in generic description. **Endosoma:** J-shaped, stout; ventral strap moderately wide, twisted over dorsal strap medially, terminating as recurved spine at level of secondary gonopore; dorsal strap wide, tilted on dorsoventral axis proximal to secondary gonopore, distad of gonopore forming attenuate ribbonlike sclerite attaining apex of endosoma and then sharply recurved; ribbonlike sclerite supporting billowy membrane, secondary gonopore transverse to axis of endosoma, subapical. **Phallotheca:** Apical portion with long crest on dorsal surface, merging with margin of aperture; aperture anterior dorsoapical aspect, very large, with undulating margin;

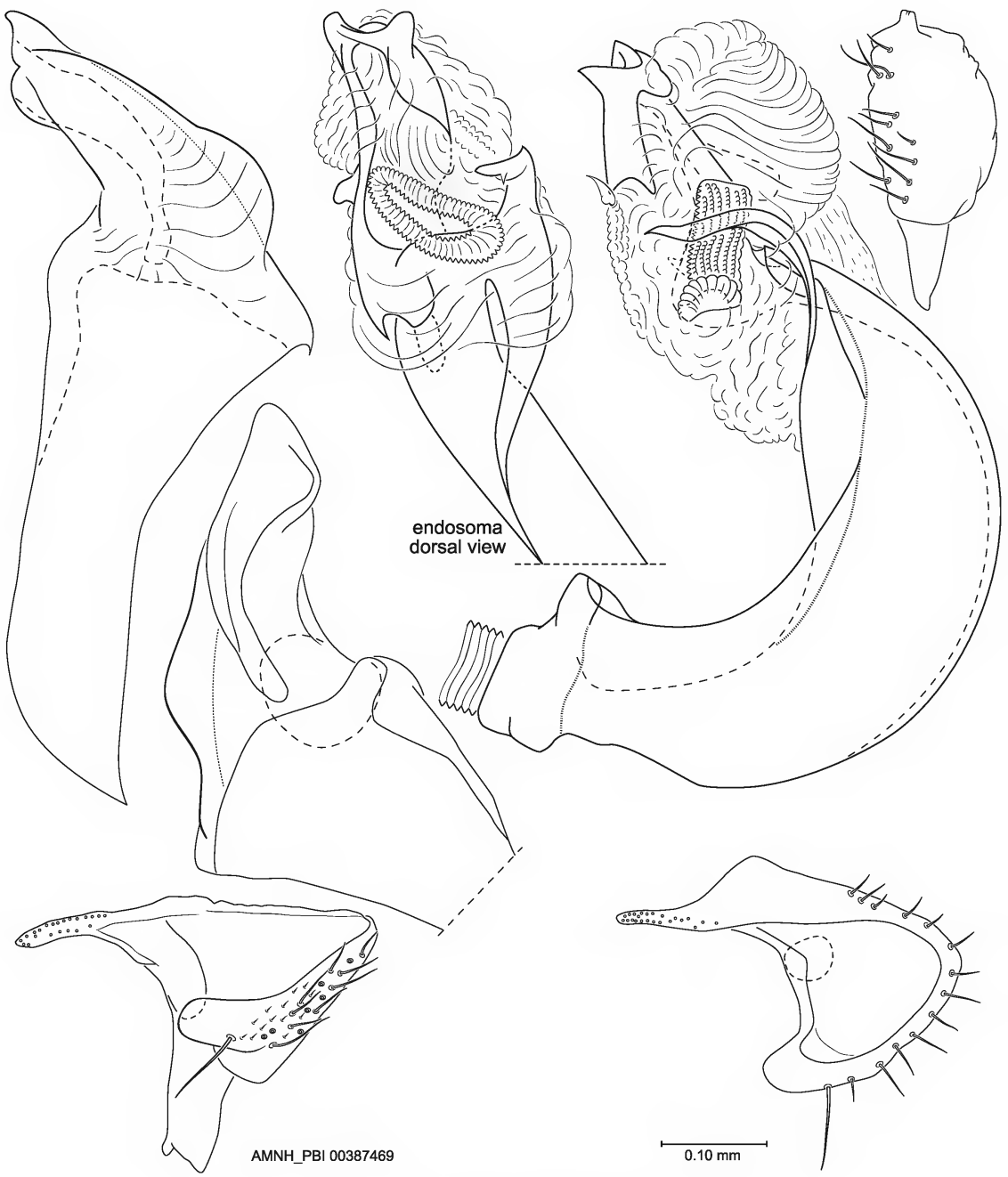


Fig. 35. Male genitalic structures of *Grandivesica kadji*.

reaching apex as wide opening. **Parameres:** Left paramere elongate with posterior process long and anterior process large, rounded apically. Right paramere large, broad, with distinct apical spine near posterior angle and another smaller point mediad.

Female (pl. 10): Coloration as in male; differing from male as in generic description; mean total length 3.78, mean pronotum width 1.17.

ETYMOLOGY: Named after Kadji Kadji, the type locality in Western Australia; a noun in apposition.

HOST: Recorded from *Eremophila miniata* (Scrophulariaceae).

DISTRIBUTION (map 8): Known from the area of the Charles Darwin Nature Reserve, Western Australia, about 350 km NNE of Perth.

HOLOTYPE: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Samphire Camp, 29.54794°S 116.96508°E, 267 m, 24 Sep 2009, C. Symonds, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387527) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Samphire Camp, 29.54794°S 116.96508°E, 267 m, 24 Sep 2009, C. Symonds, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 2♂ (00414113, 00414114), 1♀ (00414120) (UNSW), 1♂ (00414112) (WAMP). Kadji Kadji, Paradise track, 29.13733°S 116.37883°E, 236 m, 16 Sep 2009, C. Symonds & B. Glasser, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 1♂ (00414116) (AMNH), 1♂ (00414117), 1♀ (00414121) (UNSW), 1♂ (00414115) (WAMP). Kadji Kadji, Paradise track N. of No. 2 Tank, 29.16269°S 116.43063°E, 259 m, 16 Sep 2009, C. Symonds & B. Glasser, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 3♂ (00387469, 00387470, 00414118), 2♀ (00387528, 00414122) (AMNH), 1♀ (00387472), 1♂ (00414119) (UNSW), 1♂ (00387471), 2♀ (00414123, 00414124) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** Kadji Kadji, Paradise track N. of No. 2 Tank, 29.16269°S 116.43063°E, 259 m, 16 Sep 2009, C. Symonds & B. Glasser, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 8 nymphs (00414125–00414132) (UNSW).

Grandivesica pilbara, new species

Figure 36, map 8, table 1, plates 10, 11, 45D

DIAGNOSIS: Recognized by the moderate size, pale to light green coloration, and heavy dark spot on the corium at the inner angle of the cuneus (pl. 10); endosoma unique, with flattened diameter distad of basal curve, very wide across the secondary gonopore, region distad of the secondary gonopore with two long apical spines and a broad sclerite with three embedded apical points (fig. 36, pl. 11). Similar to *G. cassisi* and *G. kadji* on basis of J-shaped endosoma, and to *G. agnew* on heavy black spot on corium, but structure of endosoma unique in *G. pilbara*.

DESCRIPTION: *Male*: Mean total length 3.47, mean pronotum width 1.06. COLORATION (pl. 10): Light green to pale, hemelytron translucent, corium with a heavy dark spot at inner angle of cuneus; membrane pale, without a dark spot at apex of cells. SURFACE AND VESTITURE (pl. 10): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 10): Eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate; antennal segment 2 short, moderately stout, of uniform diameter (0.68), 0.92 times width of head; labium reaching just past midpoint of mesosternum. **Thorax** (pl. 10): Mesoscutum narrowly exposed. *Hemelytron*: Weakly elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (fig. 36, pl. 11): **Pygophore:** As in generic description. **Endosoma:** J-shaped, dorsal and ventral straps completely merged with nearly flat apical half, wide proximad of secondary gonopore, strongly notched distad of gonopore, attenuate apically with two large spines and weakly sclerotized plate with three terminal points; secondary gonopore transverse to axis of endosoma, subapical. **Phallotheca:** Apical portion with small crest merging with margin of aperture, situated on dorsal surface; aperture very long reaching from base of exposed region to apex with undulating margin, width of aperture narrowest in middle. **Parameres:** Left paramere elongate, posterior process short, anterior process short, rounded, placed medially on anterior margin. Right paramere moderately large, lanceolate, with medially placed apical projection.

Female (pl. 10): Coloration as in male; differing from male as in generic description; mean total length 3.40, mean pronotum width 1.09. GENITALIA as in plate 45D.

ETYMOLOGY: Named after the Pilbara District of Western Australia, the region of the type locality; a noun in apposition.

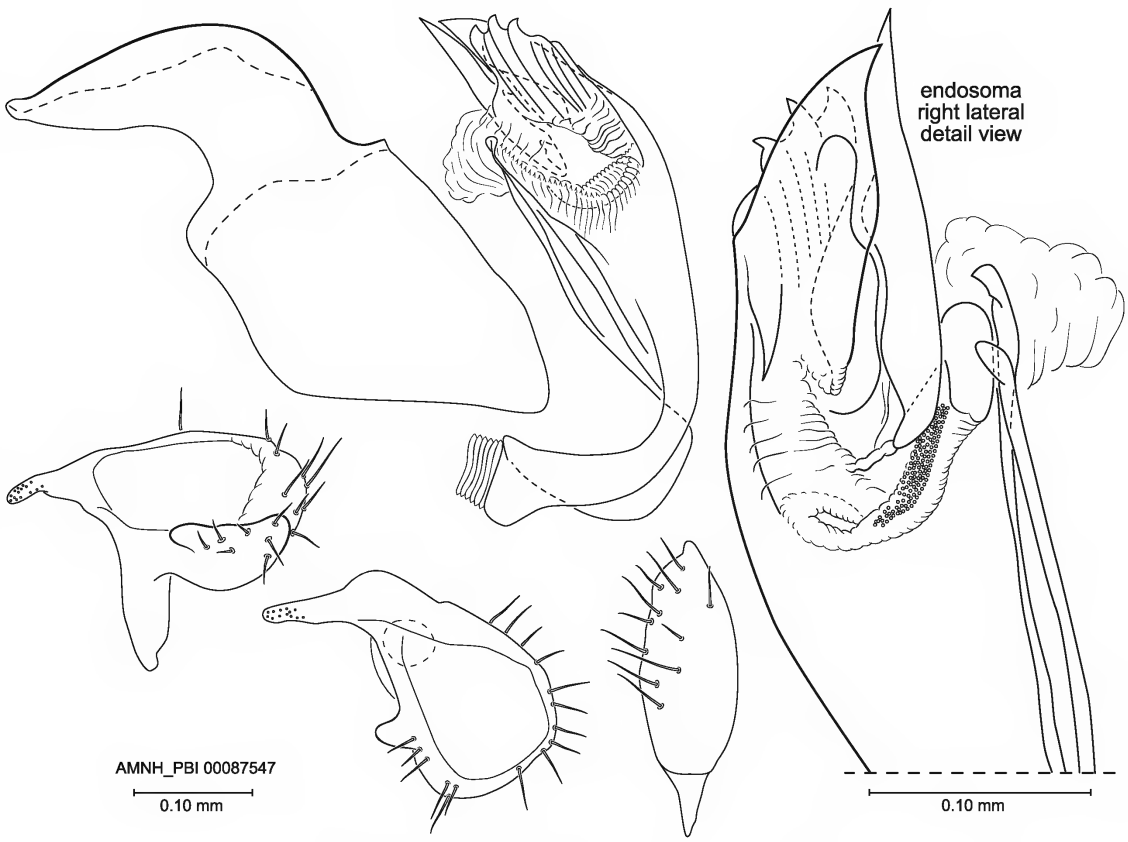


Fig. 36. Male genitalic structures of *Grandivesica pilbara.*

Hosts: Recorded from *Eremophila forrestii* (pl. 37G), *E. latrobei,* and *E. phyllopoda* (Scrophulariaceae).

Distribution (map 8): Known from the Pilbara District of Western Australia and Woomera, South Australia.

Holotype: **AUSTRALIA: Western Australia:** ***Pilbara Co.:*** 150.5 km N of Ripon Hills Rd on Marble Bar–Newman Rd, 22.35327°S 119.95483°E, 500 m, 25 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila latrobei* F. Muell. (Scrophulariaceae), det. Perth staff PERTH 7273177, 1♂ (AMNH_PBI 00412607) (WAMP).

Paratypes: **AUSTRALIA: South Australia:** Woomera, 31.19679°S 136.82289°E, 168 m, 13 Oct 1953, F.L. Hill, 1♂ (00354491) (BMNH). **Western Australia:** ***Pilbara Co.:*** 15 km from Tom Price on WNW directed track leading to Nanutarra – Wittenoom, 22.64869°S 117.61205°E, 598 m, 27 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila phyllopoda* Chinnock subsp. *obliqua* (Scrophulariaceae), det. Perth staff PERTH 7300425, 1♂ (00389753) (AM). 120 km N of Newman on Great Nthn Hwy, 23.055°S 118.86166°E, 743 m, 26 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. Field ID, 1♂ (00389866) (AM). 150.5 km N of Ripon Hills Rd on Marble Bar – Newman Rd, 22.35327°S 119.95483°E, 500 m, 25 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, 3♂ (00412592–00412594), 10♀ (00412608–00412616, 00412618) (AM), 8♂ (00412595–00412599, 00412603, 00412605, 00412606), 17♀ (00412617, 00412619, 00412620, 00412623–00412625, 00412628–00412638) (AMNH), 4♂ (00412600–00412602, 00412604), 5♀ (00412621, 00412622, 00412626, 00412627, 00412639) (WAMP). Credo Station, cnr Coolgardie Nth Rd + Nth track, 29.8818°S 120.68636°E, 438 m, 06 Sep 2011, M. Cheng & C. Symonds, *Eremophila*

forrestii F. Muell. subsp. *forrestii* (Scrophulariaceae), det. WA Herbarium MC066, 3♂ (UNSW_ENT 00025375–UNSW_ENT 00025 377), 2♀ (UNSW_ENT 00025381, UNSW_ENT 00025382) (UNSW), 1♂ (UNSW_ENT 0002 5378), 2♀ (UNSW_ENT 00025379, UNSW_ENT 00025383) (WAMP). Lochada, Boiada Camp, 29.19661°S 116.51489°E, 312 m, 16 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. subsp. *forrestii* (Scrophulariaceae), det. WA Herbarium, 1♂ (00387476), 1♀ (00387477) (UNSW); 20 Sep 2009, C. Symonds, 4♂ (00387424–00387427), 1♀ (003 87428) (UNSW). Lochada, track due W. of Kelly Well, 29.08152°S 116.5543°E, 406 m, 15 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 2♀ (003 87429, 00387430) (UNSW). Pilbara Dist., Rhodes Ridge Camp, 23.10137°S 119.3705°E, 694 m, 30 May 1999, G.Cassis, R.Silveira, host unknown, det. PERTH staff PERTH 05095182, 1♂ (00087350), 1♀ (00087351), 1♂ (00087547) (AM).

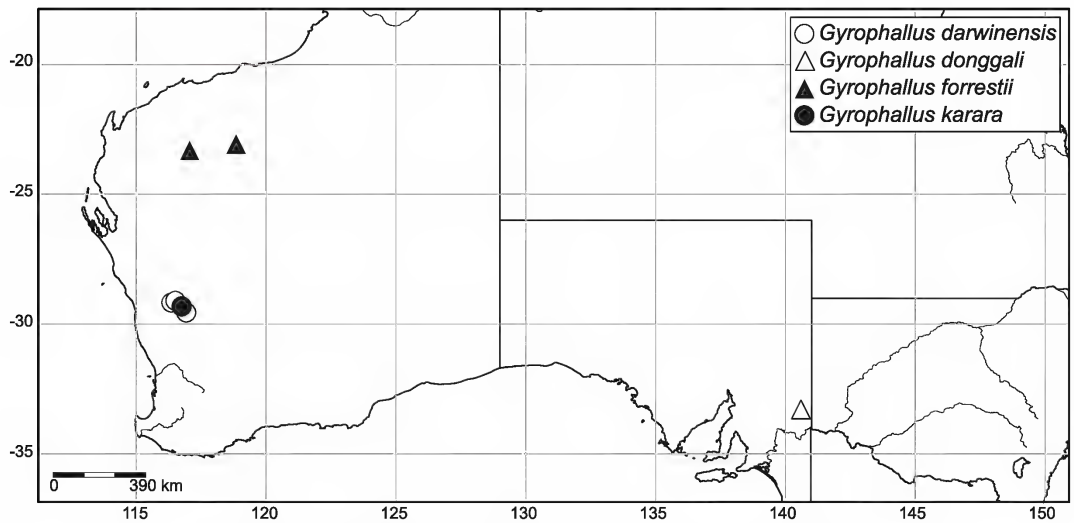
Other Specimens Examined: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 150.5 km N of Ripon Hills Rd on Marble Bar – Newman Rd, 22.35327°S 119.95483°E, 500 m, 25 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila latrobei* F. Muell. (Scrophulariaceae), det. Perth staff PERTH 7273177, 1 nymph (00412640) (AM).

Gyrophallus, new genus

Type Species: *Gyrophallus symondsae,* new species.

Diagnosis: Male recognized by the elongate, parallel-sided body form, green to pale general coloration, presence of a dark, somewhat diffuse, spot on corium near inner angle of cuneus and at apex of small membrane cell (pls. 12, 14), twisted form of J-shaped endosoma with an expanded medial region of one strap, and two—sometimes three—apical spines of varying length, always accompanied by a membranous bag covered with tiny denticles (figs. 37–44). Sexual dimorphism moderate, females shorter and more strongly ovoid than males, but with similar coloration. The relatively large size, parallel-sided body form, and general coloration—including two pairs of dark spots on the dorsum—similar to *Austroplagiognathus* spp., but endosoma in *Austroplagiognathus* distinctive with two, long, nearly parallel, apical spines and sigmoid body without twisting, whereas in *Gyrophallus* J-shaped with twisted straps.

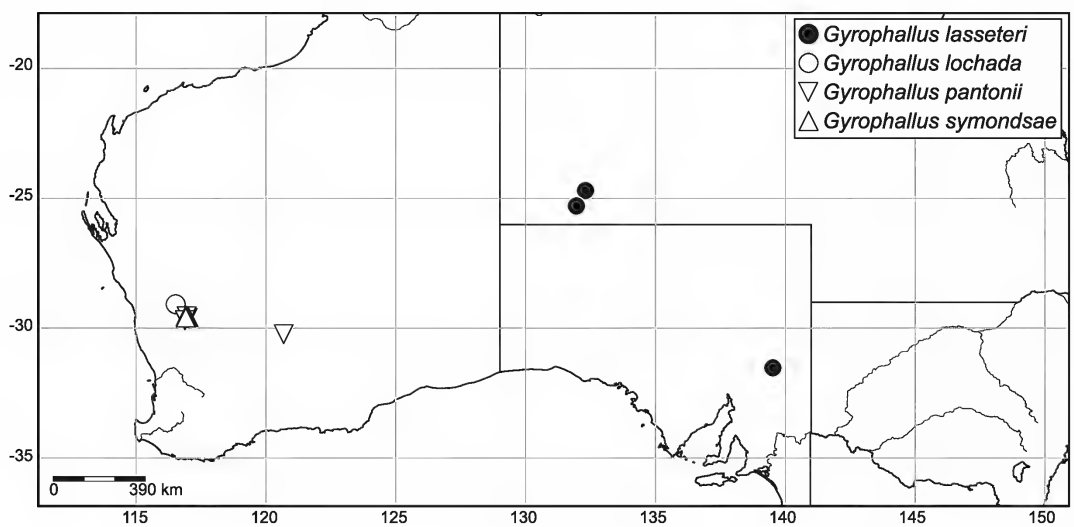
Description: *Male*: Total length 3.43–5.56, pronotum width 0.96–1.31. COLORATION (pls. 12, 14): Pale, yellowish or green, including all appendages; corium usually with infuscate mark adjacent to inner angle of cuneus; membrane usually with a dark marking at apex of cells. SURFACE AND VESTITURE (pls. 12, 14): Dorsum smooth, polished and weakly shining. Dorsum clothed with recumbent pale or dark simple setae. STRUCTURE: **Head** (pls. 12, 14): Short, transverse; frons at most weakly surpassing anterior margin of eyes; eyes moderately large, distinctly bulging, somewhat exserted from anterolateral angle of pronotum; eyes in lateral view occupying approximately two-thirds height of head; antennal segment 2 of variable length, weakly tapered proximally; antenna inserted slightly above ventral margin of eye. **Thorax** (pls. 12, 14): Pronotum with lateral margins nearly straight to weakly convex, anterior lobe short, calli weakly demarcated along posterior margin, posterior lobe at most weakly elevated, posterior margin straight to weakly concave, with rounded humeral angles; mesoscutum weakly to broadly exposed; scutellum triangular, flat. *Hemelytron*: Moderately to greatly elongate, corial margin nearly straight. GENITALIA (figs. 37–44, pls. 13, 15): **Pygophore:** Triangular, either large and narrowly elongate or of moderate size; posterior margin usually truncate; dorsal surface without tubercles or clumps of bristles. **Endosoma:** J-shaped, straps twisted, like a rope, margins of straps strongly undulating and diverging medially; middle of dorsal strap twisted, overlapping ventral strap; endosoma with two, sometimes three, apical spines of varying length and orientation, always accompanied by billowy membranous bag of varying shape, extent, and intensity of surface microtrichia; secondary gonopore terminal or nearly so, contained within membranous interstrap region of variable shape. **Phallotheca:** Apical region elongate, narrow or short and broadly conical; dorsal surface without crest, sometimes apical portion with strongly sclerotized and thickened internal ridge; aperture on anterior dorsoapical aspect, sometimes almost entirely



Map 9. Distribution of *Gyrophallus darwinensis–G. karara.*

apical, size and shape of aperture variable; basal portion usually long, reaching anteriad from one-half to three quarters length of pygophore in situ; right side usually with narrow sclerotized strap. **Parameres:** Left paramere usually with dorsoposterior margin undulating, strongly produced, sometimes medial portion prominent, inflated, and obscuring anterior process in dorsal view; posterior process with strongly undulating lateral margin and straight distal region; anterior process reduced to minute or very small—usually sharp—spine; rarely left paramere elongate in dorsal view and anterior process large; prominent seta laterad of anterior process. Right paramere moderately large or large and elongate; apical projections variable.

Female (pls. 12, 14): Coloration similar to male. Total length 3.05–5.06, pronotum



Map 10. Distribution of *Gyrophallus lasseteri–G. symondsae.*

width 0.89–1.36. Eyes smaller, vertex broader than in male; hemelytron shorter, costal margin more noticeably convex; antennal segment 2 similar in structure to that of male. GENITALIA (pl. 46): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Large, reaching to middle of sclerotized rings. *First gonapophyses*: Relatively large, quadrate basal blocks with undulate margins. *Ventral labiate plate*: Platelike medial anteroventral extension wider than lateral extent of basal gonapophysal structures, anterior surface undulate, covering anterior surface of basal structures, sometimes bent to left side. **Dorsal labiate plate:** Large; very long longitudinally. *Sclerotized rings*: Large, relatively flat, relatively thin-walled, subovoid or subtriangular. *Posteromedial region*: Surface without conspicuous microstructure. *Anterolateral region*: Anterior margin extending beyond anterior edge of sclerotized rings by length of a ring. **Posterior wall:** *Intersegmental structure*: Conspicuous triangular transverse outpocket projecting posteriorly from dorsal surface of connecting membrane. *Interramal sclerites*: Apparently entirely membranous with conspicuous microspiculate dorsal surface.

Etymology: From the Latin, *gyro*, "to turn around," and phallus, in reference to the twisted nature of the endosoma; masculine.

Gyrophallus darwinensis, new species
Figure 37, map 9, table 1, plates 12, 13

Diagnosis: Recognized by its small size, diffuse dark markings on apex of corium and on membrane (pl. 12), small J-shaped endosoma with one narrow, reflected apical spine, and a long sclerotized plate supporting membranous sac on dorsoapical surface of endosoma (fig. 37, pl. 13). *Gyrophallus darwinensis* smaller than congeners and endosomal structure also distinctive.

Description: *Male:* Mean total length 3.64, mean pronotum width 0.98. COLORATION (pl. 12): Light green to pale, mesoscutum yellow, hemelytron translucent; corium with a weak dark spot at inner angle of cuneus; membrane at most weakly fumose, with a weak spot at apex of cells. SURFACE AND VESTITURE (pl. 12): Vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 12): Eye occupying slightly less than two-thirds height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate above insertion; antennal segment 2 relatively short (0.91), 1.15 times width of head; labium reaching between midpoint and posterior margin of mesosternum. **Thorax** (pl. 12): Mesoscutum broadly exposed. *Hemelytron*: Weakly elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (fig. 37, pl. 13): **Pygophore:** Moderate in size. **Endosoma:** Small, J-shaped; dorsal strap bifid, forming slender, recurved, apical spine and wide, weakly sclerotized apical shroud; ventral strap bifid with slender, overlapping spines, one longer and thicker than other, both shorter than spine of dorsal strap. **Phallotheca:** Apical portion narrow; aperture elongate with undulating margin on anterior dorsoapical and apical aspect; basal portion reaching one-half length of pygophore in situ. **Parameres:** Left paramere relatively small, dorsoposterior region strongly inflated medially; posterior process short; anterior process truncate. Right paramere moderately large; apically truncate, with small point on anterior angle.

Female (pl. 12): Coloration as in male; differing from male as in generic description; mean total length 3.11, mean pronotum width 0.93.

Etymology: Named for the Charles Darwin Reserve, Western Australia, the type locality.

Hosts: Recorded from *Eremophila clarkei* (pl. 37D, E) and *E. miniata* (Scrophulariaceae).

Distribution (map 9): Known from the Charles Darwin Nature Reserve, about 350 km NNE of Perth, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Samphire Camp, 29.54794°S 116.96508°E, 267 m, 24 Sep 2009, C. Symonds, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387533) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Samphire Camp, 29.54794°S 116.96508°E, 267 m, 24 Sep 2009, C. Symonds, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), 1♂ (00387366), 4♂ (0038

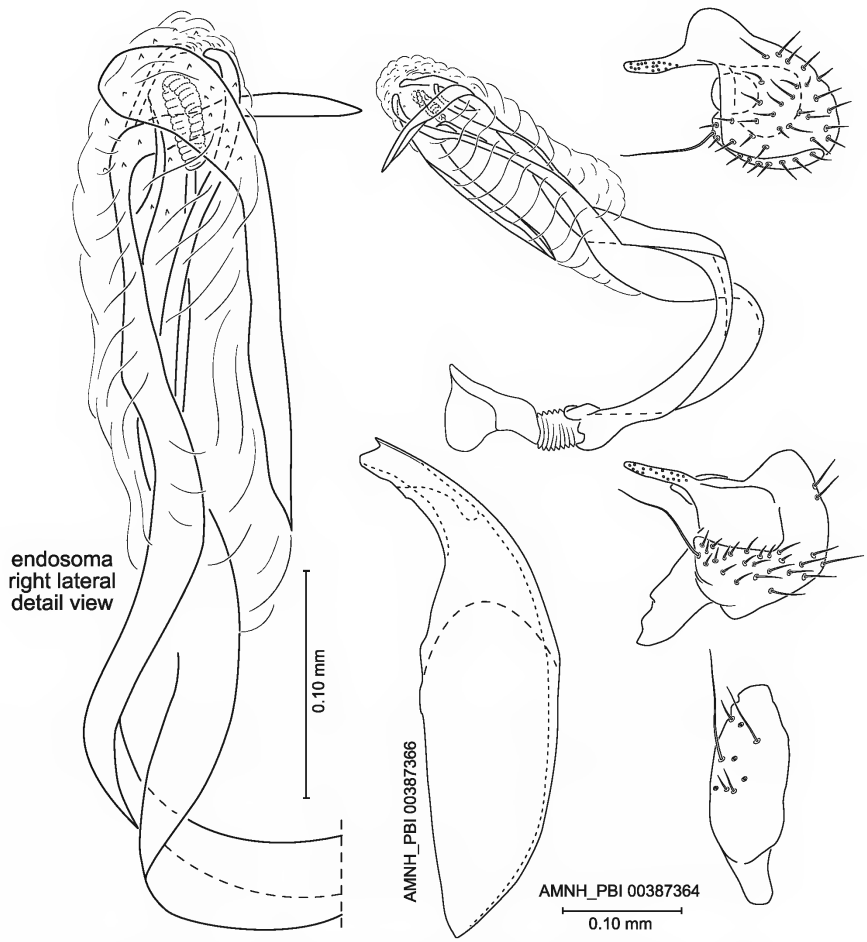


Fig. 37. Male genitalic structures of *Gyrophallus darwinensis*.

7364, 00413960, 00413961, 00413963), 4♀ (00387534, 00413973, 00413976, 00413977) (AMNH), 4♂ (00387365, 00387367–00387369), 9♀ (00387370–00387372, 00413969–00413972, 00413974, 00413975), 9♂ (00413955–00413959, 00413962, 00413964–00413966) (UNSW). Kadji Kadji, Paradise track, 29.13733°S 116.37883°E, 236 m, 16 Sep 2009, C. Symonds & B. Glasser, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 1♂ (00414098), 1♀ (00414109) (AMNH), 7♂ (00414094–00414097, 00414099–00414101), 3♀ (00414106–00414108) (UNSW), 4♂ (00414102–00414105), 2♀ (00414110, 00414111) (WAMP). Lochada, N of Killarinie Well on granite, 29.09508°S 116.54691°E, 284 m, 17 Sep 2009, C. Symonds & R. Leijs, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 2♂ (00413967, 00413968) (UNSW).

Other Specimens Examined: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Samphire Camp, 29.54794°S 116.96508°E, 267 m, 24 Sep 2009, C. Symonds, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 2 nymphs (00413978, 004139 79) (UNSW).

Gyrophallus donggali, new species
Figure 38, map 9, table 1, plates 12, 13, 46B, D, G

Diagnosis: Recognized by the moderate size, the large J-shaped endosoma with the middle conspicuously wide, and the three relatively large, diverging apical spines (fig. 38, pl. 13).

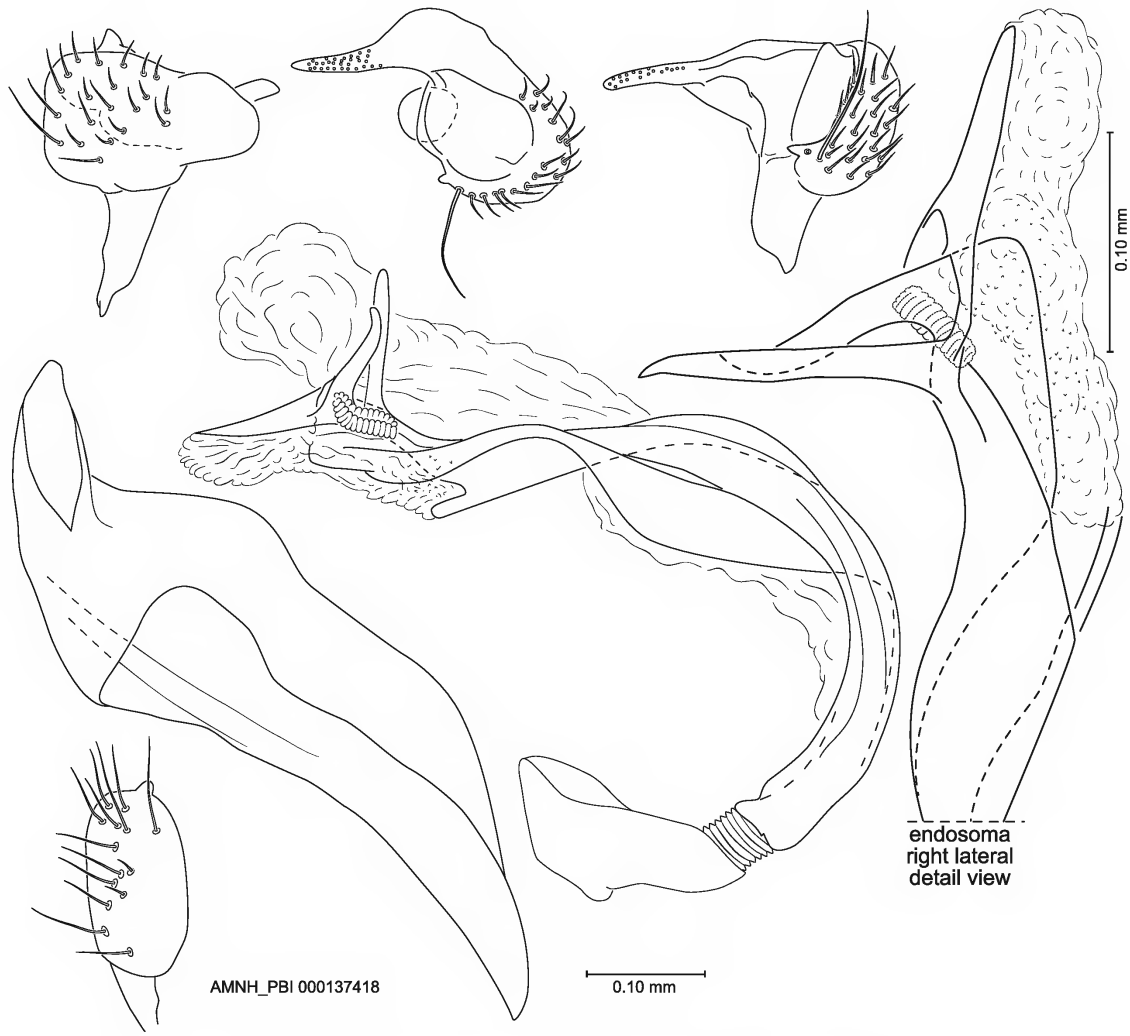


Fig. 38. Male genitalic structures of *Gyrophallus donggali*.

Most similar in size to *G. karara*; structure of male genitalia also distinctive.

Description: *Male:* Mean total length 4.10, mean pronotum width 1.04. COLORATION (pl. 12): Light green to pale, hemelytron cloudy; corium with a weak dark spot at inner angle of cuneus; membrane at most weakly fumose, with a weak dark spot at apex of cells. SURFACE AND VESTITURE (pl. 12): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 12): Eye occupying about three-fifths height of head; antenna inserted just above ventral margin of eye, eye weakly emarginated; antennal segment 2 of moderate length (1.17), 1.33 times width of head; labium reaching to about posterior margin of mesosternum. **Thorax** (pl. 12): Mesoscutum broadly exposed. *Hemelytron*: Moderately elongate, costal margin nearly straight, cuneus elongate. GENITALIA (fig. 38, pl. 13): **Pygophore:** Large and elongate. **Endosoma:** Large, J-shaped; dorsal strap trifurcate apically with one straight spine and two parallel transverse spines of unequal length; ventral strap terminating proximal of secondary gonopore. **Phallotheca:** Apical portion short and broadly conical; aperture on anterior dorsoapical aspect, relatively large ovoid; basal portion reaching anteriad to three

quarters length of pygophore in situ; right side with narrow sclerotized strap. **Parameres:** Left paramere with sharp apex of anterior process. Right paramere moderately large; apically truncate with a small point on anterolateral angle.

Female (pl. 12): Coloration as in male; differing from male as in generic description; mean total length 3.85, mean pronotum width 1.08. GENITALIA as in plate 46B, D, G.

ETYMOLOGY: Named for the Donggali Conservation Park, South Australia, the type locality; a noun in apposition.

HOST: Recorded from *Eremophila scoparia* (Scrophulariaceae).

DISTRIBUTION (map 9): Known only from the Donggali Conservation Park south of Oakbank and northeast of Adelaide, South Australia.

HOLOTYPE: **AUSTRALIA: South Australia:** Donggali Cons. Park, 30.1 km S of Oakbank, 33.28742°S 140.5881°E, 100 m, 08 Nov 1996, Schuh and Cassis, *Eremophila scoparia* (R.Br.) F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 05236533, 1♂ (AMNH_PBI 00137418) (SAMA).

PARATYPES: **AUSTRALIA: South Australia:** Donggali Cons. Park, 30.1 km S of Oakbank, 33.28742°S 140.5881°E, 100 m, 08 Nov 1996, Schuh and Cassis, *Eremophila scoparia* (R.Br.) F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 05236533, 5♀ (00128504–00128508) (AM), 1♂ (00128500), 2♀ (00128502, 00128503) (AMNH), 1♀ (00128501) (SAMA).

Gyrophallus forrestii, new species

Figure 39, map 9, table 1, plates 12, 13

DIAGNOSIS: Recognized by large size, endosoma with two long, slender, overlapping, apical spines, a separate, medium-sized, membranous sac on subapical ventral margin (fig. 39, pl. 13), elongate left paramere with produced dorsoposterior margin, long posterior process, and relatively large anterior process, and elongate right paramere with truncate apex (fig. 39). Most similar in size to *G. lasseteri, G. pantonii,* and *G. symondsae*, but structure of male genitalia distinctive, with two long, slender apical spines, one straight and one recurved (pl. 13).

DESCRIPTION: *Male:* Mean total length 4.72, mean pronotum width 1.19. COLORATION (pl. 12): Light green to pale, hemelytron cloudy; corium with a diffuse dark spot at inner angle of cuneus; membrane cloudy, with a weak dark spot at apex of cells. SURFACE AND VESTITURE (pl. 12): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 12): Eye occupying slightly more than three-fifths height of head; antenna inserted just above ventral margin of eye, eye emarginate above insertion; antennal segment 2 relatively short (1.09), 1.20 times width of head; labium very long, reaching onto pygophore. **Thorax** (pl. 12): Mesoscutum moderately exposed. *Hemelytron*: Greatly elongate, costal margin weakly convex, cuneus long. GENITALIA (fig. 39, pl. 13): **Pygophore:** Moderate in size. **Endosoma:** Moderately large, apical spines sigmoid and overlapping; dorsal strap with straight apical spine; ventral strap bifid with long, recurved apical spine and lateral sclerite supporting billowy membrane. **Phallotheca:** Apical portion elongate and narrow; dorsal surface with short ridge; aperture elongate ovoid on anterior dorsoapical aspect; basal portion reaching to three quarters length of pygophore in situ. **Parameres:** Left paramere elongate with dorsoposterior margin projecting posteriad in dorsal view, anterior process large. Right paramere long, apically truncate, with subapical constriction; two apical projections, posterior point prominent.

Female (pl. 12): Coloration as in male; differing from male as in generic description; mean total length 4.06, mean pronotum width 1.20.

ETYMOLOGY: Named for the host species *Eremophila forrestii* (Scrophulariaceae).

HOST: Recorded from *Eremophila forrestii* (pl. 37G) (Scrophulariaceae).

DISTRIBUTION (map 9): Known from the Pilbara District of Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** ***Pilbara Co.:*** 120 km N of Newman on Great Nthn Hwy, 23.055°S 118.86166°E, 743 m, 26 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila forrestii* F. Muell. (Scrophulariaceae), 1♂ (AMNH_PBI 00389764) (WAMP).

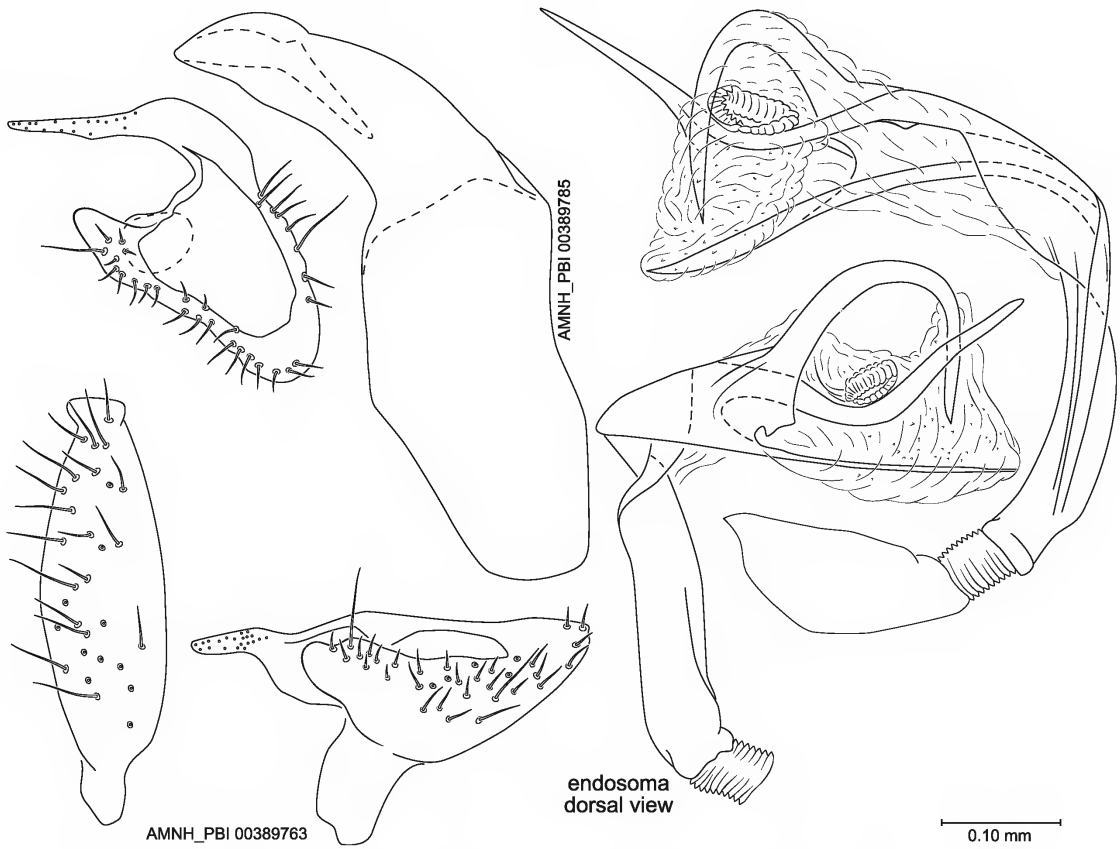


Fig. 39. Male genitalic structures of *Gyrophallus forrestii*.

PARATYPES: **AUSTRALIA: Western Australia:** ***Pilbara Co.:*** 45 km N of Newman on Great Nthn Hwy, 23.28366°S 117.06722°E, 26 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. Perth staff PERTH 7300506, 2♂ (00389785, 00389787) (AM), 1♂ (00389786) (UNSW). 120 km N of Newman on Great Nthn Hwy, 23.055°S 118.86166°E, 743 m, 26 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. Field ID, 3♀ (00389766, 00389769, 00389770) (AM), 2♀ (00389768, 00389771) (AMNH), 1♀ (00389767) (UNSW), 1♂ (0038 9765), 1♀ (00389772) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** ***Pilbara Co.:*** 45 km N of Newman on Great Nthn Hwy, 23.28366°S 117.06722°E, 26 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. Perth staff PERTH 7300506, 1 nymph (00389788) (AM). 120 km N of Newman on Great Nthn Hwy, 23.055°S 118.86166°E, 743 m, 26 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. Field ID, 4 nymphs (00389773–0038 9776) (AM).

Gyrophallus karara, new species
Figure 40, map 9, table 1, plates 12, 13

DIAGNOSIS: Recognized by the moderate size, endosoma with two uneven-length, parallel, subapical spines, one about twice the length of the other, and additional terminal spine and membranous sac on distoventral aspect (fig. 40, pl. 13). Most similar in size to *G. donggali*, but endosomal structure distinctive, with longest apical spine recurved,

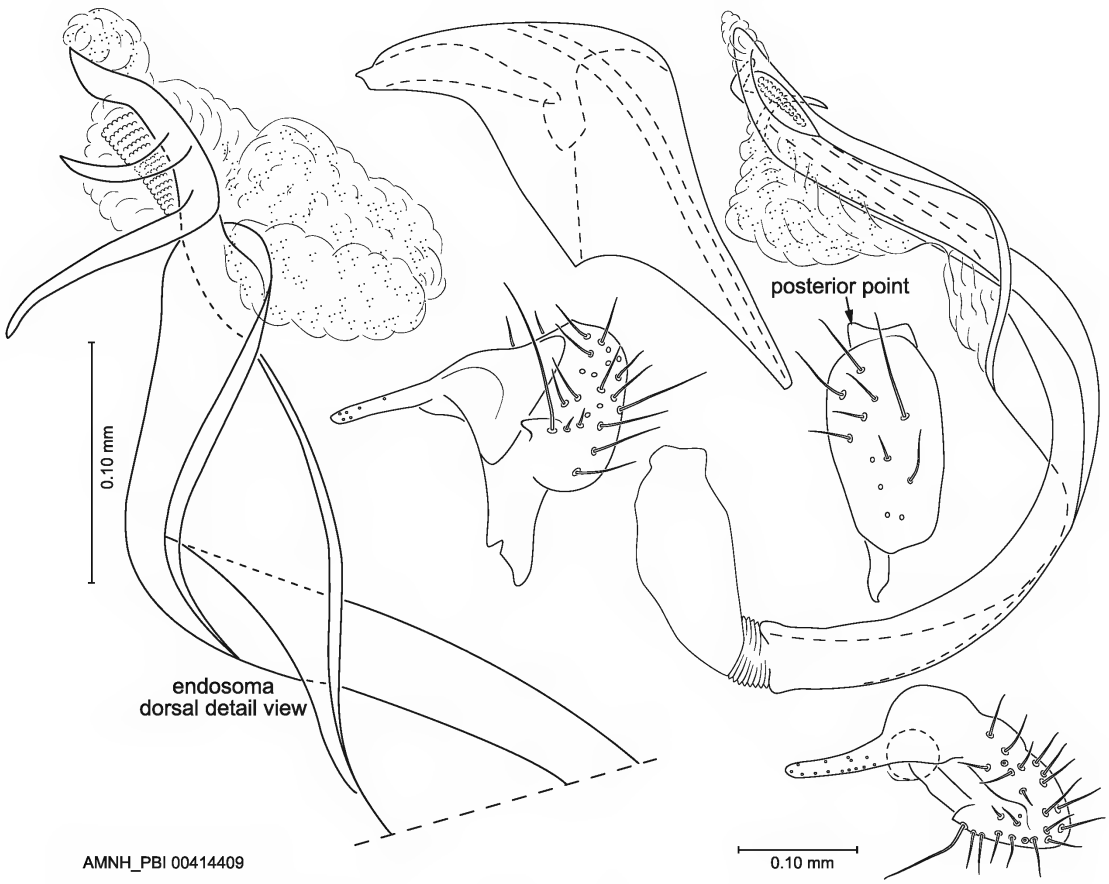


Fig. 40. Male genitalic structures of *Gyrophallus karara*.

transverse, at level of base of secondary gonopore (pl. 13).

DESCRIPTION: *Male:* Total length 4.00, mean pronotum width 1.11. COLORATION (pl. 12): Light green, hemelytron translucent; corium without dark spot at inner angle of cuneus; membrane fumose, with a weak dark spot at apex of cells. SURFACE AND VESTITURE (pl. 12): Vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 12): Eye occupying about third-quarters height of head; antenna inserted somewhat above ventral margin of eye, eye weakly emarginate; antennal segment 2 short (0.94), 1.20 times width of head; labium reaching to posterior margin of mesonotum. **Thorax** (pl. 12): Mesoscutum moderately exposed. *Hemelytron*: Moderately elongate, costal margin weakly convex, cuneus relatively short. GENITALIA (fig. 40, pl. 13): **Pygophore:** Moderate in size. **Endosoma:** Moderately large, J-shaped; dorsal strap trifurcate with one subapical, long transverse spine and two short, somewhat thickened, terminal spines, one transverse and other apical; ventral strap terminating at level of secondary gonopore. **Phallotheca:** Apical portion short and broadly conical; aperture on anterior dorsoapical aspect, elongate ovoid; with strongly sclerotized and thickened internal ridge; basal portion reaching anteriad to one-half length of pygophore in situ. **Parameres:** Left paramere with sharp apex of anterior process. Right paramere moderately broad, with apical two points, posterior point prominent.

Female: Unknown.

ETYMOLOGY: Named for Karara, Western Australia, the type locality; a noun in apposition.

HOST: The holotype and only known specimen was taken on *Eremophila latrobei* (Scrophulariaceae).

DISTRIBUTION (map 9): Known only from the type locality, Karara, in the Pilbara District, Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** Karara, John Forrest Lookout, 29.30822°S 116.73052°E, 357 m, 18 Sep 2009, C. Symonds, *Eremophila latrobei* F. Muell. *latrobei* (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00414409) (WAMP).

Gyrophallus lasseteri, new species
Figure 41, map 10, table 1, plates 12, 13

DIAGNOSIS: Recognized by large size, large J-shaped endosoma with wide middle and strongly intertwined straplike distal sclerites supporting an extensive billowy membrane, two terminally overlapping strongly curved apical spines (fig. 41, pl. 13), and an elongate right paramere (fig. 41). Most similar in size to *G. forrestii, G. pantonii,* and *G. symondsae*, but broad medial area and flattened, curved, overlapping apical spines of endosoma distinctive (pl. 13).

DESCRIPTION: *Male:* Total length 4.83, pronotum width 1.31. COLORATION (pl. 12): Green to yellow, hemelytron translucent; corium with an intense dark spot at inner angle of cuneus; membrane weakly fumose, with a small dark spot at apex of cells. SURFACE AND VESTITURE (pl. 12): Vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 12): Eye occupying about two-thirds height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate; antennal segment 2 relatively long (1.34), 1.4 times width of head; labium very short, reaching to apex of procoxa. **Thorax** (pl. 12): Mesoscutum broadly exposed. *Hemelytron*: Greatly elongate, costal margin weakly convex, cuneus long. GENITALIA (fig. 41, pl. 13): **Pygophore:** Large and elongate. **Endosoma:** Large, J-shaped with well-sclerotized undulating margins, two large, tightly intertwined, strongly curved apical spines, one formed by each strap, and a large membranous bag on distoventral surface supported by a sclerotized process arising near base of secondary gonopore; secondary gonopore subapical. **Phallotheca:** Apical portion short and broadly conical; aperture on anterior dorsoapical aspect, relatively large ovoid; basal portion reaching anteriad to one-half length of pygophore in situ, right side with narrow sclerotized strap. **Parameres:** Left paramere large; dorsoposterior margin inflated with median bulge in dorsal view, with sharp apex of anterior process. Right paramere elongate, apically truncate with two points, posterior point prominent.

Female (pl. 12): Coloration as in male; differing from male as in generic description; mean total length 4.70, mean pronotum width 1.31.

ETYMOLOGY: Named after D.H. Lasseter, the Central Australian gold prospector, and the localities named after him.

HOST: Recorded from *Eremophila longifolia* (pl. 38F, G) (Scrophulariaceae). We posit that one specimen recorded on *Grevillea stenobotrya* (Proteaceae) is mislabeled and should read *E. longifolia,* which our field data indicate was documented as a host at the same site as *G. stenobotrya*.

DISTRIBUTION (map 10): Known from the Alice Springs region of Central Australia and northern South Australia.

HOLOTYPE: **AUSTRALIA: Northern Territory:** 25 km E of Curtin Springs on Lasseter Hiway, 25.28334°S 131.9609°E, 491 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea stenobotrya* F. Muell. (Proteaceae), det. NSW staff NSW666273, 1♂ (AMNH_PBI 00413048) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** ~66 km N of Lasseter Hiway on Luritja Road, 24.68335°S 132.3212°E, 545 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila longifolia* (R. Br.) F. Muell. (Scrophulariaceae), det. Field ID, 1♀ (00413049) (AM). **South Australia:** 14.3 km S of Erudina Woolshed, 31.53334°S 139.5506°E, 86 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila longifolia* (R. Br.) F. Muell. (Scrophulariaceae), det. NSW staff NSW666363, 2♀ (00413050, 00413051) (AM).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Northern Territory:** 25 km E of Curtin Springs on Lasseter Hiway, 25.28334°S 131.9609°E, 491 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila longifolia* (R. Br.) F. Muell. (Scrophulariaceae), det. NSW staff

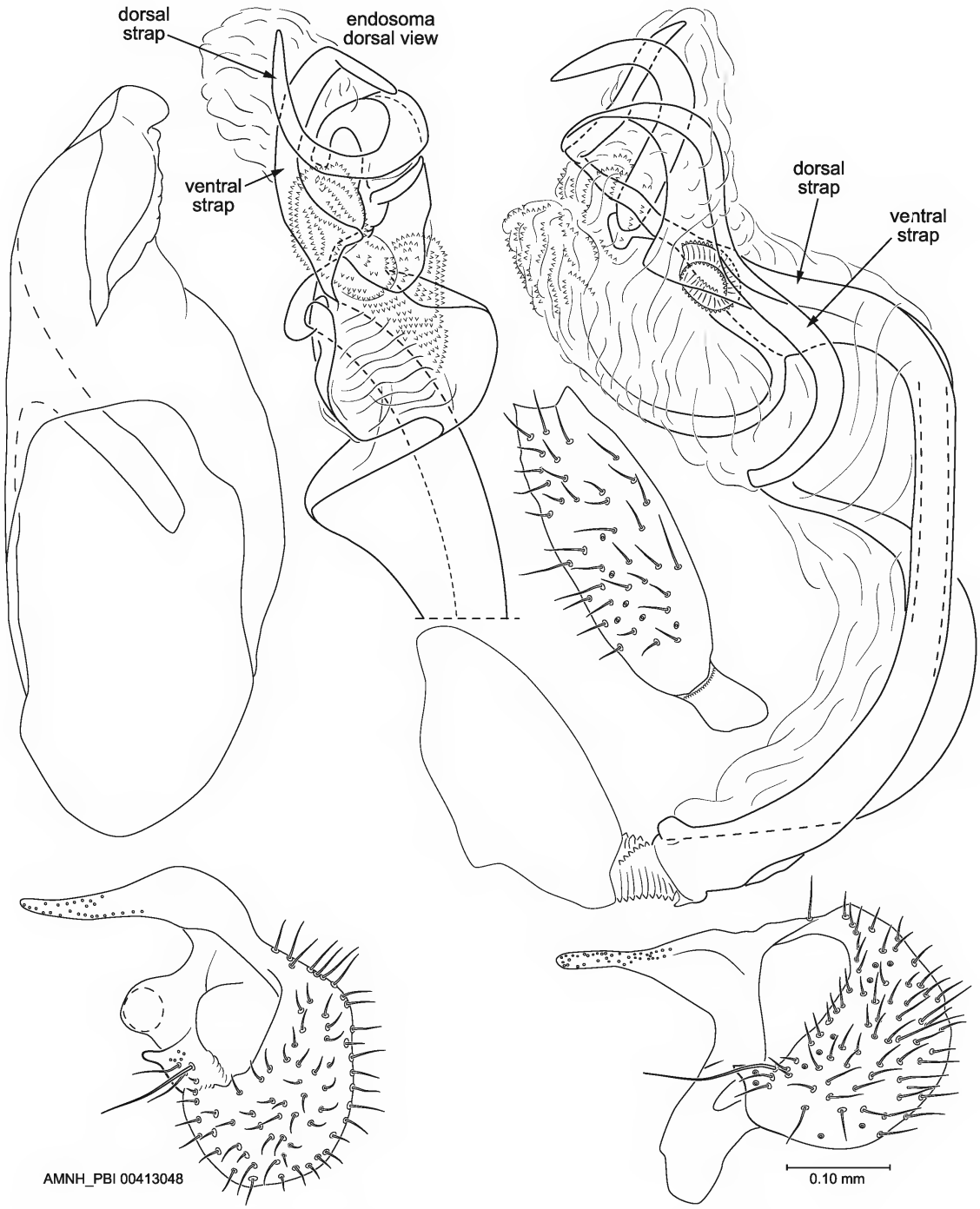


Fig. 41. Male genitalic structures of *Gyrophallus lasseteri.*

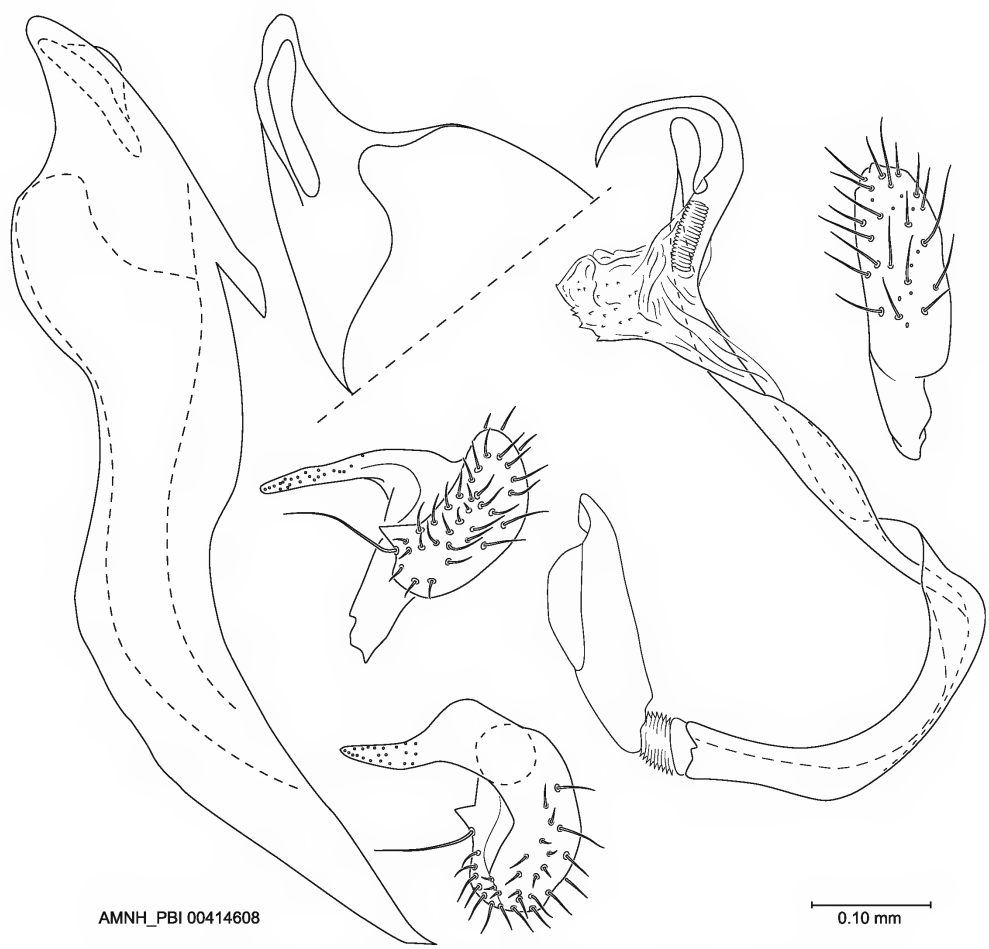


Fig. 42. Male genitalic structures of *Gyrophallus lochada*.

NSW666286, 3♀ (00097950–00097952) (AMNH), 2♀ (00097953, 00097954) (MNT).

Gyrophallus lochada, new species
Figure 42, map 10, table 1, plates 12, 13

Diagnosis: Recognized by moderately large size, strong sexual dimorphism (pl. 12), J-shaped endosoma with a long, slender, recurved apical spine subtended by a short spatulate apical spine, and ventral surface of endosoma with a small discrete subapical membranous sac (fig. 42, pl. 13). Most similar in size to *G. lasseteri*, but endosomal structure distinctive with only a single, long, slender, recurved spine surpassing apex (pl. 13).

Description: *Male:* Total length 4.50, pronotum width 0.81. COLORATION (pl. 12): Green to pale, hemelytron translucent; corium with a weak dark spot at inner angle of cuneus; membrane weakly fumose, with a small, weak, dark spot at apex of cells. SURFACE AND VESTITURE (pl. 12): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 12): Eye occupying two-thirds height of head; antennae inserted just above ventral margin of eye, eye slightly emarginate; antennal segment 2 relatively short (1.03), 1.27 times width of head; labium reaching apex of mesocoxa. **Thorax** (pl. 12): Mesoscutum narrowly exposed. *Hemelytron*: Elongate, costal margin weakly convex, cuneus long. GENITALIA (fig. 42, pl. 13): **Pygophore:** Moderate in size. **Endosoma:** Moderately large, J-shaped; dorsal strap bifid

apically with long recurved spine and short, blunt, weakly sclerotized spine; ventral strap terminating proximal to secondary gonopore; gonopore subtended by a membranous bag on ventral surface of endosoma. **Phallotheca:** Apical portion short and broadly conical; aperture on anterior dorsoapical aspect, elongate ovoid; basal portion long reaching anteriad to three quarters length of pygophore in situ; right margin with a strongly sclerotized strap. **Parameres:** Left paramere with entire dorsoposterior margin strongly projecting dorsad; anterior process with a sharp apex. Right paramere moderately large, blunt apically, with a minute point on posterior angle.

Female (pl. 12): Coloration as in male; differing from male as in generic description; total length 3.45, pronotum width 0.85.

Etymology: Named after the type locality, Lochada, Western Australia; a noun in apposition.

Host: Recorded from *Eremophila forrestii* (pl. 37G) (Scrophulariaceae).

Distribution (map 10): Known from the type locality, Lochada, southeast of Geraldton, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Lochada, track due W. of Kelly Well, 29.08152°S 116.5543°E, 406 m, 15 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00414608) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Lochada, track due W. of Kelly Well, 29.08152°S 116.5543°E, 406 m, 15 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♀ (00414609) (UNSW).

Gyrophallus pantonii, new species
Figure 43, map 10, table 1, plates 14, 15

Diagnosis: Recognized by large size, pale coloration (pl. 14), strongly twisted J-shaped endosoma with an elongate curved, sharp apical spine of moderate length, a folded sclerotized plate supporting dorsal aspect of a discrete billowy membranous sac laterad of secondary gonopore (fig. 43, pl. 15), and left paramere with medial portion of dorsoposterior margin conspicuously elevated (fig. 43). Most similar in size to *G. forrestii, G. lasseteri*, and *G. symondsae*, but endosomal structure distinctive with discrete membrane sac adjacent to secondary gonopore (pl. 15).

Description: *Male:* Mean total length 5.19, mean pronotum width 1.21. COLORATION (pl. 14): Light green to pale, hemelytron cloudy; corium with a diffuse dark spot at inner angle of cuneus; membrane weakly fumose, with a weak dark spot at apex of cells. SURFACE AND VESTITURE (pl. 14): Vestiture of reclining, dark, common setae. STRUCTURE: **Head** (pl. 14): Eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate; antennal segment 2 moderately long (1.37), 1.48 times width of head; labium reaching posterior margin of mesosternum. **Thorax** (pl. 14): Mesoscutum moderately exposed. *Hemelytron*: Greatly elongate, costal margin nearly straight, cuneus long. GENITALIA (fig. 43, pl. 15): **Pygophore:** Moderate in size. **Endosoma:** Moderately large, J-shaped, tightly twisted; ventral strap terminating as a large curved solitary spine; dorsal strap terminating with large thin, weakly folded sclerite forming support of billowy membranous bag dorsad of secondary gonopore. **Phallotheca:** Apical portion elongate and narrow, conical; aperture on anterior dorsoapical aspect, elongate ovoid; basal portion long, reaching anteriad to three quarters length of pygophore in situ. **Parameres:** Left paramere with dorsoposterior margin strongly produced and narrowed to medial prominence; anterior process long, relatively large, and narrow. Right paramere moderately large, irregularly lanceolate, with a well-developed point on posterior angle.

Female (pl. 14): Coloration as in male; differing from male as in generic description; mean total length 4.33, mean pronotum width 1.21.

Etymology: Named after one of the known hosts, *Eremophila pantonii* (Scrophulariaceae).

Hosts: Recorded from *Eremophila oppositifolia* and *E. pantonii* (Scrophulariaceae).

Distribution (map 10): Known from the area of the Charles Darwin Nature Reserve, Western Australia, about 350 km NNE of Perth.

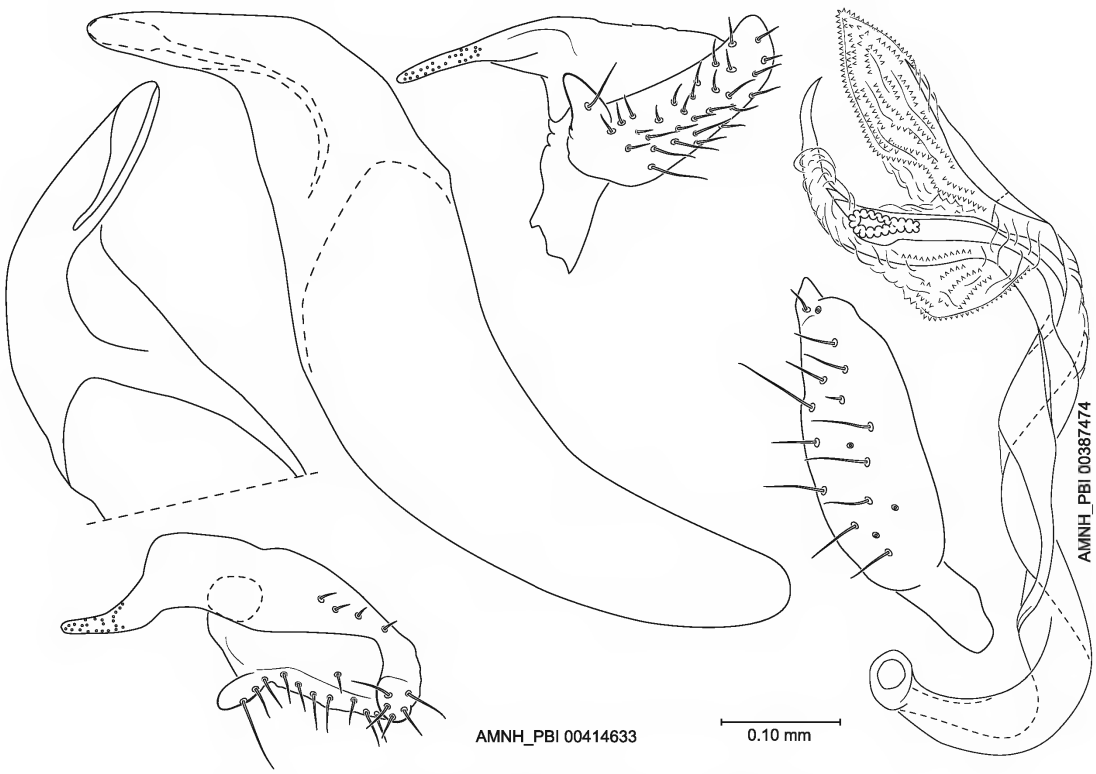


Fig. 43. Male genitalic structures of *Gyrophallus pantonii*.

HOLOTYPE: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, track N of Wanarra Rd to Samphire Camp, 29.5508°S 116.96463°E, 254 m, 24 Sep 2009, C. Symonds, *Eremophila pantonii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387529) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Breakaway, Wanarra Rd, 6.9km E of homestead, 29.57497°S 117.03708°E, 22 Sep 2009, C. Young, 1♂ (00387553) (UNSW). Charles Darwin Reserve, Wanarra Rd at breakaway, 29.57861°S 117.03363°E, 292 m, 23 Sep 2009, C. Symonds, *Eremophila oppositifolia* R. Br. *angustifolia* (Scrophulariaceae), det. WA Herbarium, 2♀ (00414137, 00414138) (AMNH), 2♂ (00414133, 00414136), 1♀ (00414140) (UNSW), 1♂ (00414134), 1♀ (00414139) (WAMP). Charles Darwin Reserve, track N of Wanarra Rd to Samphire Camp, 29.5508°S 116.96463°E, 254 m, 24 Sep 2009, C. Symonds, *Eremophila pantonii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (00387474), 1♀ (00387530) (AMNH), 2♂ (00387473, 00414135), 2♀ (00414141, 00414142) (UNSW). Charles Darwin Reserve, track to White Dam, 29.68594°S 116.92094°E, 307 m, 22 Sep 2009, C. Symonds, *Eremophila oppositifolia* R. Br. *angustifolia* (Scrophulariaceae), det. WA Herbarium, 1♂ (00414632) (AMNH), 1♂ (00414633) (UNSW). Credo Station, off track between Six Mile Dam and Easter Dam, 30.22158°S 120.69811°E, 432 m, 05 Sep 2011, M. Cheng & C. Symonds, *Eremophila oppositifolia* R. Br. *angustifolia* (Scrophulariaceae), det. WA Herbarium MC043, 1♂ (UNSW_ENT 00024831) (AMNH), 1♀ (UNSW_ENT 00024836) (UNSW), 1♀ (UNSW _ENT 00024837) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, track N of Wanarra Rd to Samphire Camp, 29.5508°S 116.96463°E, 254 m, 24 Sep 2009, C. Symonds, *Eremophila pantonii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 2 nymphs (00414143, 00414144) (UNSW).

Gyrophallus symondsae, new species
Figure 44, map 10, table 1, plates 14, 15, 46A, C, E, F, H

DIAGNOSIS: Recognized by the elongate, parallel-sided body form, strongly green coloration (pl. 14), strongly twisted J-shaped endosoma with a pair of erect apical spines surpassing secondary gonopore by about length of gonopore, a much longer, slender spine at right angles to body of endosoma, a small, ventral membranous sac (fig. 44, pl. 15), and phallotheca with a small apical aperture (fig. 44). Most similar in size to *G. forrestii, G lasseteri, and G. pantonii,* but endosomal structure distinctive with a very long spine at right angle to body of endosoma at level of base of secondary gonopore (pl. 15).

DESCRIPTION: *Male:* Mean total length 4.97, mean pronotum width 1.14.COLORATION (pl. 14): Green to yellow, hemelytron translucent; corium with a small dark spot at inner angle of cuneus; membrane fumose, with a faint dark marking at apex of cells. SURFACE AND VESTITURE (pl. 14): Vestiture of reclining, pale, common setae. STRUCTURE: **Head** (pl. 14): Eye occupying slightly less than two-thirds height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate at and above insertion; antennal segment 2 relatively long (1.26), 1.48 times width of head; labium reaching midpoint of mesosternum. **Thorax** (pl. 14): Mesoscutum narrowly exposed. *Hemelytron*: Strongly elongate, costal margin nearly straight, cuneus very long and slender. GENITALIA (fig. 44, pl. 15): **Pygophore:** Large and elongate. **Endosoma:** Moderately large, with three diverging apical spines; dorsal strap bifid proximal to secondary gonopore, forming a very long, slender apical spine at right angles to body of endosoma and a shorter erect spine; ventral strap terminating distad of gonopore with wide, flattened, attenuate apical spine surrounded in denticle-covered membrane, including secondary gonopore; subapical membranous bag with denticles on ventral surface of endosoma. **Phallotheca:** Apical portion elongate conical with widened base, left side with strongly sclerotized and thickened internal ridge, dorsal surface without crest; aperture ovoid situated entirely apicad; basal portion long, reaching anteriad to three-quarters length of pygophore in situ; right side with narrow internal sclerotized strap. **Parameres:** Left paramere with entire dorsoposterior margin strongly elevated dorsad. Right paramere moderately elongate, apically with two points on lateral angles, point on posterior angle prominent.

Female (pl. 14): Coloration as in male; differing from male as in generic description, sexual dimorphism rather strong; mean total length 4.14, mean pronotum width 1.09. GENITALIA: As in plate 46A, C, E, F, H.

ETYMOLOGY: Named after Celia Symonds, collector of specimens of this taxon and in recognition of her contributions to our knowledge of Australian Cremnorrhinina.

HOSTS: Recorded from *Eremophila miniata, E. oldfieldii*, and *Eremophila* sp. (Scrophulariaceae).

DISTRIBUTION (map 10): Known from the Charles Darwin Nature Reserve, Western Australia, about 350 km NNE of Perth.

HOLOTYPE: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Wanarra Rd at breakaway, 29.57861°S 117.03363°E, 292 m, 23 Sep 2009, C. Symonds, *Eremophila oldfieldii* F. Muell. *oldfieldii* (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387531) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Samphire Camp, 29.54794°S 116.96508°E, 267 m, 24 Sep 2009, C. Symonds, *Eremophila miniata* C.A. Gardner (Scrophulariaceae), det. WA Herbarium, 1♂ (00387374), 1♀ (00387380) (AMNH), 4♂ (00387373, 00387375, 00387377, 00387378), 3♀ (00387379, 00387381, 00387382) (UNSW), 1♂ (00387376) (WAMP). Charles Darwin Reserve, Wanarra Rd at breakaway, 29.57861°S 117.03363°E, 292 m, 23 Sep 2009, C. Symonds, *Eremophila oldfieldii* F. Muell. *oldfieldii* (Scrophulariaceae), det. WA Herbarium, 7♀ (00387461, 00387532, 00414025, 00414030–00414033), 2♂ (00413999, 00414002) (AMNH), 1♀ (00414023) (ANIC), 1♀ (00414022) (CNC), 10♂ (00387457–00387459, 00413997, 00413998, 00414000, 00414001, 00414003–00414005), 17♀ (00414006–00414017, 00414019, 00414026–00414029)

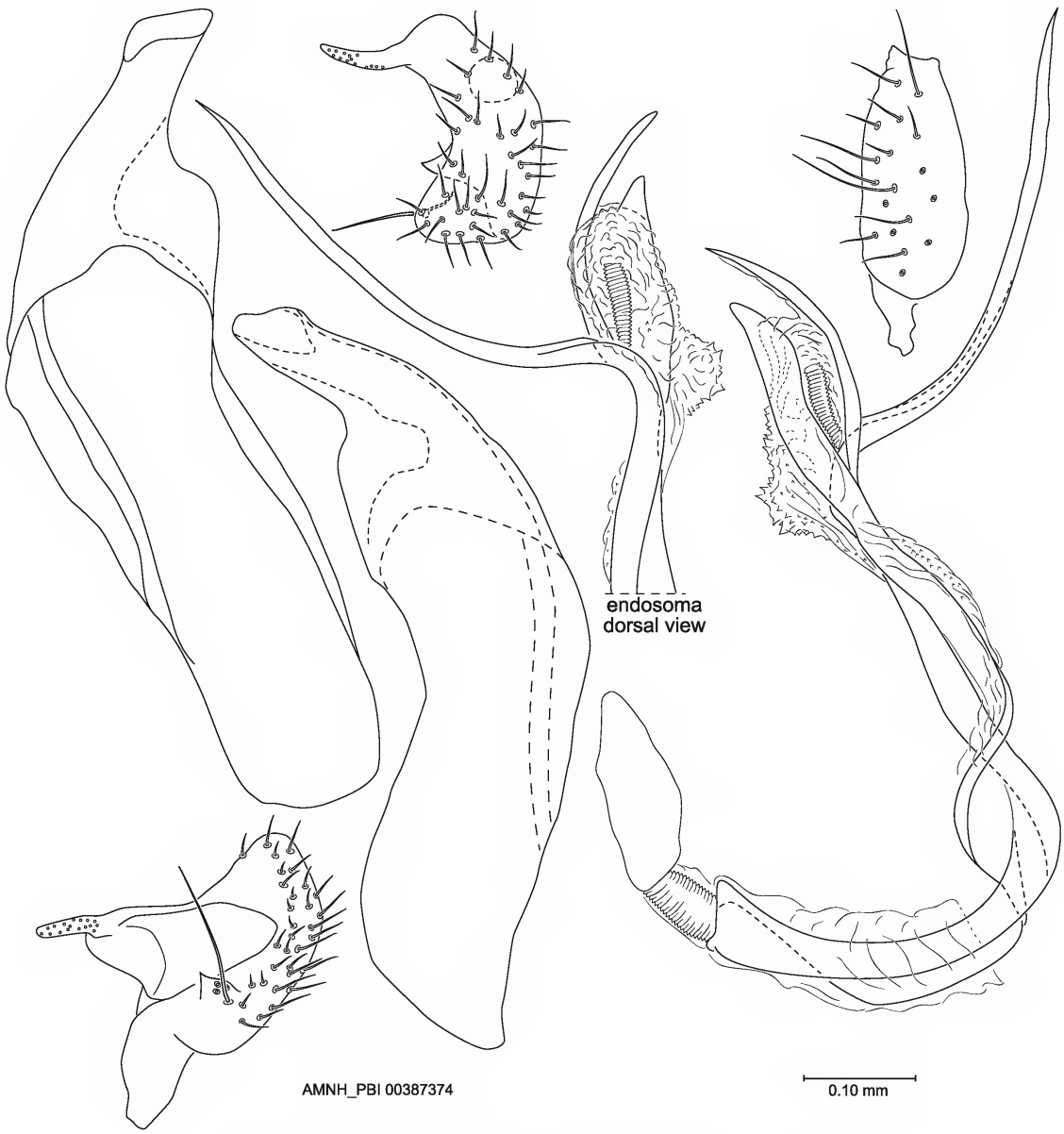


Fig. 44. Male genitalic structures of *Gyrophallus symondsae*.

(UNSW), 1♀ (00414024) (USNM), 1♂ (00387460), 2♀ (00414020, 00414021) (WAMP), 1♀ (00414018) (ZISP). Charles Darwin Reserve, track to White Dam, 29.60866°S 116.92169°E, 319 m, 22 Sep 2009, C. Symonds, 2♂ (00387453, 00387454) (AMNH), *Eremophila* sp. (Scrophulariaceae), det. WA Herbarium, 3♂ (00414038–00414040), 2♀ (00414041, 00414042) (UNSW).

Other Specimens Examined: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, Wanarra Rd at breakaway, 29.57861°S 117.03363°E, 292 m, 23 Sep 2009, C. Symonds, *Eremophila oldfieldii* F. Muell. *oldfieldii* (Scrophulariaceae), det. WA Herbarium, 4 nymphs (00414034–00414037) (UNSW).

Halophylus, new genus

Type Species: *Halophylus tecticornii*, new species.

DIAGNOSIS: Head short and broad, vertex broad; weakly to rather strongly elongate, nearly parallel sided to elongate ovoid, coloration varying from deep brown, to pale green, to nearly white, sometimes showing substantial variation within a given species; body surface with woolly sericeous setae and some reclining, common setae; at least hind femora always with some dark spots, tibiae usually with dark spots at bases of spines (weak or absent in *H. salsoli* and *H. tecticornii*); dorsum sometimes with blotchy spots in pale species; ventral surface of pygophore with a field of stout bristle; endosoma relatively short, stout, sigmoid, with two somewhat twisted apical spines, spines relatively stout, at least one usually bent or modified apically; secondary gonopore usually with field of obvious denticles on outer surface ventrad of aperture; posteroapical margin of left paramere undulating, produced posteriad and elevated dorsad of posterior and anterior processes. Female shorter than male, sometimes markedly so, more strongly ovoid (pl. 16). Most easily confused with *Pulvillophylus* on structure of apical endosomal spines and field of gonoporal denticles, but in *Halophylus* endosoma somewhat twisted, each endosomal strap forming a single apical spine, and dorsoposterior margin of left paramere strongly produced (pl. 17). *Pulvillophylus* with a single apical spine, this derived from ventral strap and bifid or hooklike apically (pl. 27), face weakly to very strongly elongate, and femora without spots (pl. 26); woolly sericeous setae otherwise present in *Lepidophylus*, *Proteophylus grevillea*, and *P. occidentalis*, and some *Pulvillophylus* spp. Females of *Halophylus* and *Pulvillophylus* with a posteriorly directed medial projection on subgenital plate, a structural feature also seen in *Maculiphylus*.

DESCRIPTION: *MALE*: Total length 2.94–4.14, pronotum width 0.92–1.26. COLORATION (pl. 16): Overall coloration ranging from mostly chocolate brown, including appendages, to light green, to mostly pale; antennae and femora dark in dark species, pale in light-coloration taxa; dorsum with spots or blotches in some pale-colored species; tibiae always pale, in most species tibial spines with dark bases. SURFACE AND VESTITURE (fig. 45B, C, E, pl. 16): Dorsum with woolly sericeous setae and some reclining, common setae. STRUCTURE (pl. 16): Body form often broad and nearly parallel sided, sometimes elongate ovoid. **Head** (fig. 45A, B, pl. 16): Head short and broad, eyes moderately to distinctly bulging; antennal segment 2 relatively long. **Thorax** (pl. 16): Pronotum weakly campanulate, with straight sides, or with sides weakly convex; calli often clearly demarcated along posterior margin; posterior lobe nearly flat, posterior margin straight to weakly excavated. Pretarsus and in figure 45F. *Hemelytron*: Costal margin often straight, hemelytron nearly parallel sided, sometimes more weakly convex and body form elongate ovoid. GENITALIA (figs. 45D, E, 46–51, pl. 17): **Pygophore:** Elongate conical with truncate posterior margin; single, long, erect seta located just ventrad of aperture and anteriad of each paramere insertion; ventral surface with broad field of short, stout bristles. **Endosoma:** Sigmoid, relatively short, distal one-half strongly bent to left in dorsal view; dorsal and ventral straps adhered to one another beyond secondary gonopore; each strap forming a variably shaped apical spine, usually of unequal length, sometimes twisted; secondary gonopore placed within ventral half of interstrap membrane, ovoid, usually well sclerotized, always with field of strong denticles on outer (dorsal) surface. **Phallotheca:** Apical portion narrowly conical and pointed; dorsal surface without crest; aperture elongate fusiform, attaining apex, situated on anterior dorsal surface. **Parameres:** Left paramere with distinctly and strongly undulating dorsoposterior margin, very strongly elevated dorsad of posterior and anterior processes; posterior process short, narrow, and straight apically, lateral margin undulating in dorsal view; anterior process relatively long, length subequal to posterior process; prominent seta, if present, placed apicolaterally on anterior process. Right paramere broadly fusiform, widest just distad of middle, attenuate apically, tapering to short medial or anteromedial spine.

FEMALE (pl. 16): Sexual dimorphism weak to strong, hemelytron ranging from slightly shorter than in male to strongly reduced and just covering abdomen; total length 2.50–4.45,

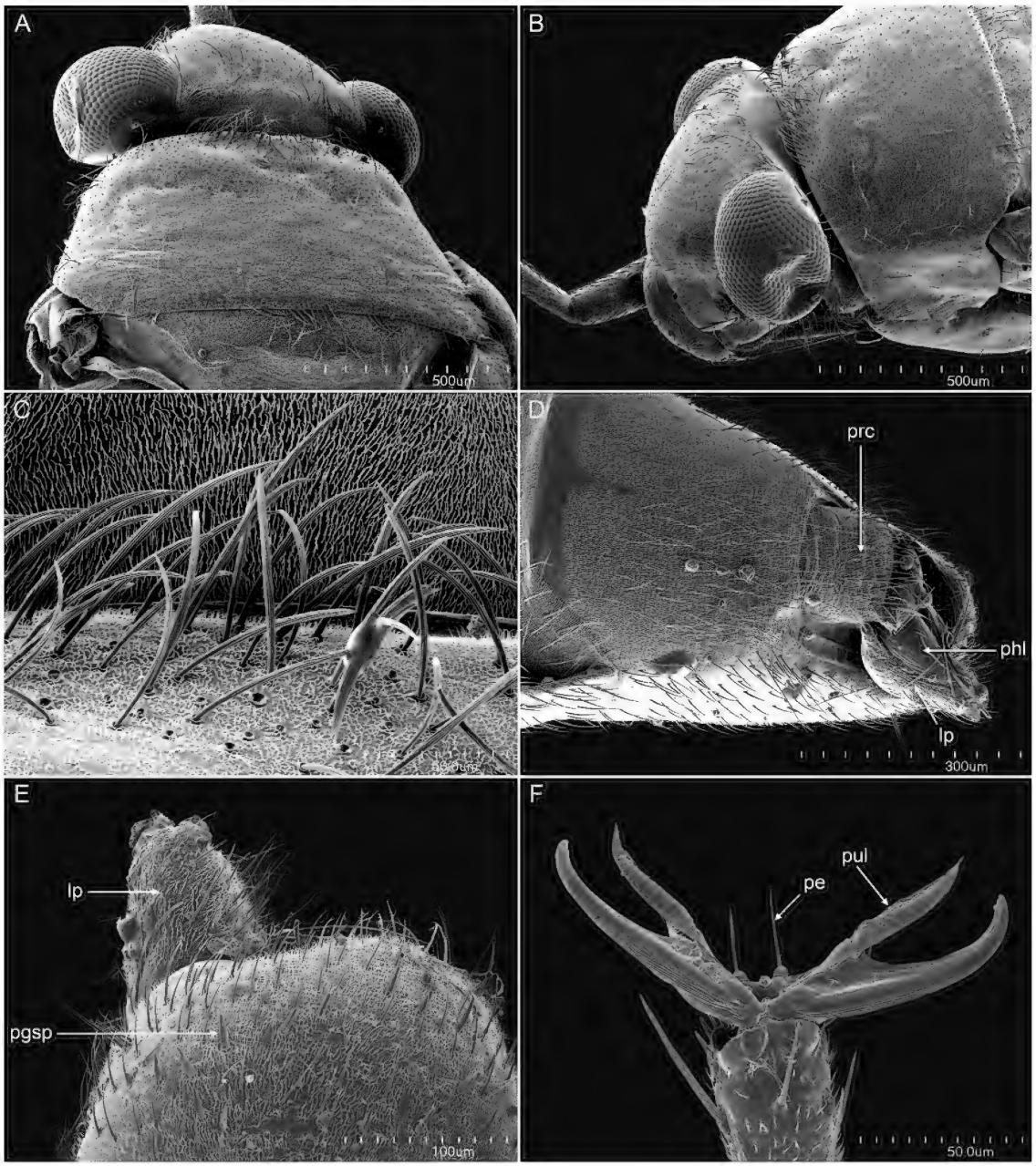
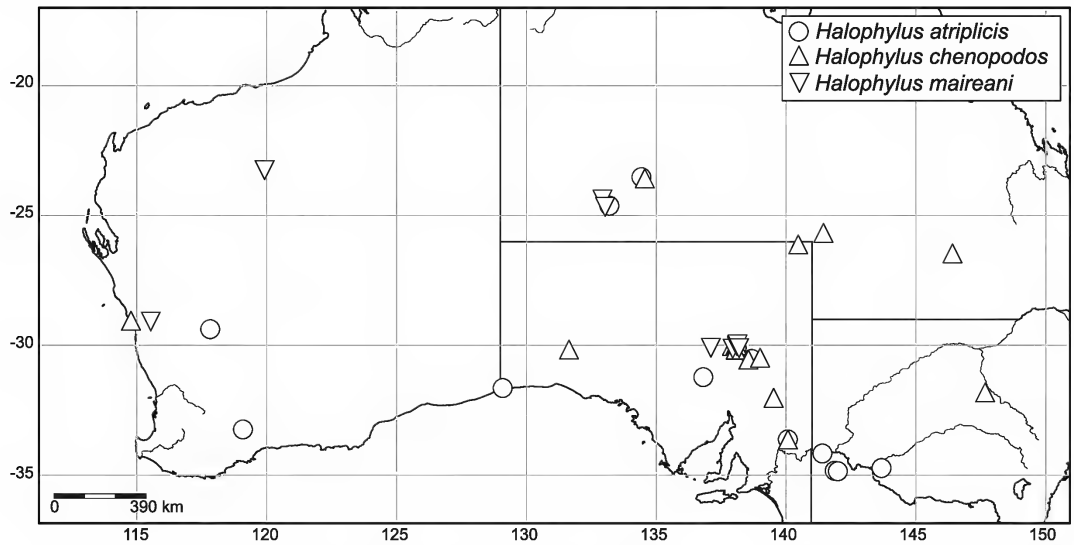


Fig. 45. *Halophylus tecticornii*. Scanning electron micrographs. **A.** Dorsofrontal view of head and pronotum. **B**. Lateral view of head and pronotum. **C.** Detail of pronotal setae. **D.** Dorsolateral view of pygophore. **E.** Ventral view of pygophore showing field of heavy setae. **F.** Dorsal view of pretarsus. Abbreviations: **lp,** left paramere; **pe**, parempodium; **pgsp,** phygophoral spines; **phl,** phallotheca; **prc,** proctiger; **pul**, pulvillus.

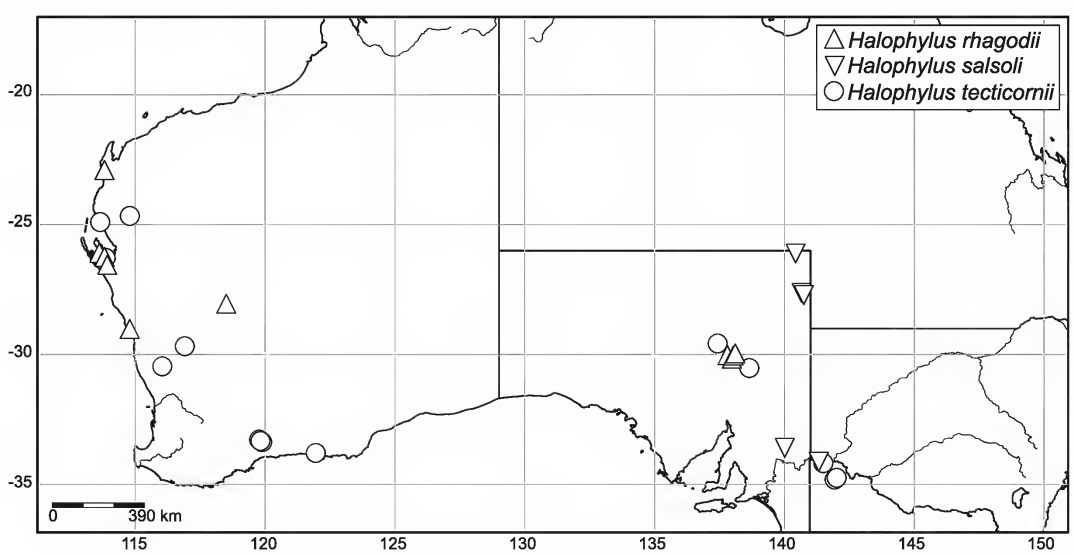
pronotum width 0.94–1.42. GENITALIA (pl. 47): **Subgenital plate of sternite 6:** With posteriorly directed medial projection. **Vestibular sclerites:** Medium sized, attaining anterior edge of dorsal labiate plate. *First gonapophyses*: Relatively small basal blocks with undulate margins. *Ventral labiate plate*: Platelike medial anteroventral extension



Map 11. Distribution of *Halophylus atriplicis–A. maireani.*

short, not as wide as lateral extent of basal gonapophysal structures, covering anterior surface of basal structures. **Dorsal labiate plate:** Medium sized, short longitudinally, with stepped anterior margin. *Sclerotized rings*: Relatively small, triangular, slightly concave, relatively thick walled; with strong spicules anteriad of rings. *Posteromedial region*: Surface without conspicuous microstructure. *Anterolateral region*: Anterior margin extending slightly beyond anterior edge of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Variable bilobed transverse outpocket projecting anteriorly from ventral surface of connecting membrane. *Interramal sclerites*: Faintly sclerotized, lateral sclerites broadly wedge shaped, medial sclerite apparently absent.

ETYMOLOGY: From the Greek, *halos*, "salt," and the generic name *Phylus*; masculine.



Map 12. Distribution of *Halophylus rhagodii–A. tecticornii.*

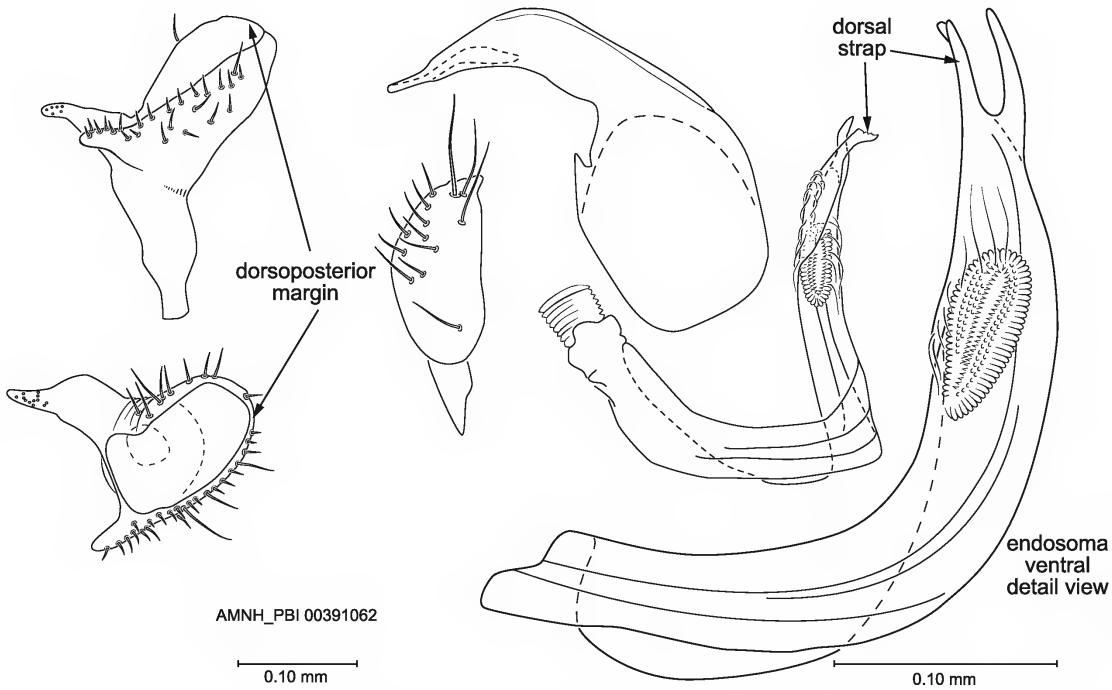


Fig. 46. Male genitalic structures of *Halophylus atriplicis*.

Discussion: See discussion under *Pulvillophylus*.

Halophylus atriplicis, new species
Figure 46, map 11, table 1, plates 16, 17

Diagnosis: Recognized by overall pale coloration, dorsum with blotchy light brown spots, robust, parallel-sided body form, short broad head, tibiae with distinct spots at bases of spines (pl. 16), and apical endosomal spines subequal in length (fig. 46, pl. 17). Female not as elongate as male. Most easily confused with *H. chenopodos* based on the spotted dorsum, but that species more strongly elongate and ovoid, head not as strongly transverse, dorsum with spots rather than botches and not including membrane (pl. 16), and apical spines of endosoma of unequal length (fig. 47).

Description: *Male*: Mean total length 3.18, mean pronotum width 1.01. COLORATION (pl. 16): Overall coloration mostly pale with contrasting light brown blotches (diffuse large spots) on dorsum, including membrane; antennae and legs pale; femora with contrasting dark spots, tibial spines with dark bases. SURFACE AND VESTITURE (pl. 16): Dorsum with woolly sericeous setae and some reclining, pale common setae. STRUCTURE (pl. 16): Body form broad and nearly parallel sided. **Head** (pl. 16): Head short and broad, eyes moderately to distinctly bulging; eye occupying only slightly more than one-half height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate; antennal segment 2 elongate, slender (1.11), 1.28 times width of head; labium reaching posterior margin of mesocoxa. **Thorax:** (pl. 16): Pronotum with straight sides, calli weakly demarcated along posterior margin, posterior margin straight; mesoscutum moderately exposed. *Hemelytron*: Costal margin nearly straight, hemelytron nearly parallel sided. GENITALIA (fig. 46, pl. 17): As in generic description but with the following details. **Pygophore:** Ventral surface with many stout pale bristles. **Endosoma:** Dorsal apical spine gently curved ventrad with slightly expanded, somewhat sharply truncate apex (in lateral view); subapically ventral apical spine bent laterad, parallel to dorsal apical spine apically, and subequal

in length; secondary gonopore without denticles. **Parameres:** Left paramere with dorsoposterior surface greatly elevated dorsad of posterior and anterior processes. Right paramere as in figure 46.

Female (pl. 16): Coloration as in male; shorter than male but sexual dimorphism weak; mean total length 2.74, mean pronotum width 0.94.

Etymology: From the generic name *Atriplex*, in reference to its occurrence on this and other halophytic plant genera.

Hosts: Recorded from *Atriplex bunbury*, *A. nummularia* (pl. 32A, B), *A.* sp., and *Neobassia astrocarpa* (Chenopodiaceae; see Materials and Methods); also recorded from *Parthenium hysterophorus* (Asteraceae), *Nitraria billardierei* (Nitrariaceae) and *Eremophila* aff. *weldii* (Scrophulariaceae); we regard the last three as errors resulting from specimen handling.

Distribution (map 11): Widely distributed in the dry interior regions of Australia.

Holotype: **AUSTRALIA: New South Wales:** 9.5 km E of Balranald on Sturt Hwy, 34.702°S 143.615°E, 20 Oct 1996, Schuh and Cassis, *Atriplex nummularia* Lindl. *omissa* (Amaranthaceae), det. PERTH staff PERTH 05054680, 1♂ (AMNH_PBI 00136798) (AM).

Paratypes: **AUSTRALIA: New South Wales:** 9.5 km E of Balranald on Sturt Hwy, 34.702°S 143.615°E, 20 Oct 1996, Schuh and Cassis, *Nitraria billardierei* DC. (Nitrariaceae), det. PERTH staff PERTH 05095247, 1♀ (00414379) (AM), *Atriplex nummularia* Lindl. subsp. *omissa* (Chenopodiaceae), det. PERTH staff PERTH 05054680, 43♂ (00135373–00135385, 00136779–00136797, 00136799–00136809), 26♀ (00135395–00135407, 00136810–00136822) (AMNH). **Northern Territory:** 11 km W of Henbury Homestead at Henbury Meteorite craters, 24.57194°S 133.14861°E, 451 m, 17 May 2013, M. Cheng & C. Duykers, *Atriplex nummularia* Lindl. *nummularia* (Chenopodiaceae), det. NT Herbarium Staff – Alice Springs, 2♂ (00414461, 00414462), 2♀ (00414473, 00414474) (AMNH), 9♂ (00414463–00414471), 5♀ (00414472, 00414475–00414478) (UNSW). Trephina Gorge National Park, 23.51668°S 134.3798°E, 572 m, 25 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, 2♂ (00097128, 00413069), 1♀ (00097129) *Parthenium hysterophorus* L. (Asteraceae), det. NSW staff NSW658343, 3♂ (00098072, 00098074, 00098075), 1♀ (00098073) (AMNH). **South Australia:** 25 km E of Copely, Flinders Range, 30.51668°S 138.631°E, 450 m, 08 Nov 2001, Cassis, Schuh, and Schwartz, sp. not determined (Chenopodiaceae), det. NSW staff NSW666355, 1♂ (00391062) (AM), *Atriplex nummularia* Lindl. (Chenopodiaceae), det. NSW staff NSW666355, 9♂ (00098936–00098941, 00097141, 00413070, 00413073), 10♀ (00098942–00098950, 00097142) *Parthenium hysterophorus* L. (Asteraceae), det. NSW staff NSW666355, 5♂ (00098255–00098259) (AMNH). 66–69 km NW of Morgan, Cane Grass, 33.58334°S 140.0333°E, 150 m, 02 Nov 1995, Schuh, Cassis, and Gross, sp. not determined (Chenopodiaceae), det. R.T. Schuh NSW 395972, 20♂ (00132158–00132177), 19♀ (00132178–00132196) (AM). Nullabor National Park 5 km E of WA border, 31.63716°S 129.0346°E, 50 m, 22 Oct 1996, Schuh and Cassis, *Eremophila* aff. *weldii* F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 05054699, 1♂ (00413072) (AMNH). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02083°S 138.04472°E, 212 m, 11 Oct 2010, A. Namyatova, 1♂ (00414495) (UNSW); 13 Oct 2010, A. Namyatova, 1♂ (00414494) (UNSW). Woomera, 31.19679°S 136.82289°E, 168 m, 13 Oct 1953, F.L. Hill, 8♂ (00174081–00174088), 1♀ (00174089) (BMNH). **Victoria:** 41.8 Km W of Hattah, Murray Sunset National Park, 34.80035°S 141.919°E, 53 m, 03 Nov 2002, Cassis, Schuh, Schwartz, Silveira, *Atriplex* sp. (Chenopodiaceae), det. NSW staff NSW658092, 18♂ (00412841–00412858),16♀ (00412859–00412874) (AMNH).

Murray Sunset National Park, Lost Hope Track, 34.79166 °S 141.8357°E, 55 m, 03 Nov 2002, Cassis, Schuh, Schwartz, Silveira, *Atriplex* sp. (Chenopodiaceae), det. NSW staff NSW658092, 1♂ (00412875) (AMNH). Neds Corner, Neds Corner Homestead – outside Kitchen, 34.14075°S 141.32805°E, 37 m, 26 Nov 2011, M. Cheng, 1♂ (UNSW_ENT 00024919) (UNSW). **Western Australia:** 12.5 km S of Newdegate, 33.19482°S 119.0753°E, 250 m, 07 Dec 1997, Schuh, Cassis, Brailovsky, Asquith, *Atriplex* sp. (Chenopodiaceae), 2♀ (00412839, 00412840) (AMNH). 15 km SE of Paynes Find toward Beacon, 29.34286°S 117.8014°E, 250 m, 12 Dec 1997, Schuh, Brailovsky, *Atriplex bunburyana* F. Muell. (Chenopodiaceae), det. PERTH staff PERTH 05879094, 1♂ (00412877), 2♀ (00412878, 00412879) (AMNH). Fowlers Camp (at end

of Fowlers Camp Rd), Shark Bay World Heritage Area, 26.10801°S 113.6167°E, 24 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Neobassia astrocarpa* (F. Muell.) A.J. Scott (Chenopodiaceae), det. PERTH staff PERTH6987893, 2♀ (00414377, 00414378) (AM).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: New South Wales:** 9.5 km E of Balranald on Sturt Hwy, 34.702°S 143.615°E, 20 Oct 1996, Schuh and Cassis, *Atriplex nummularia* Lindl. *omissa* (Amaranthaceae), det. PERTH staff PERTH 05054680, 1 adult, sex unknown (00412876), 9 nymphs (00135386–00135394) (AMNH).

Halophylus chenopodos, new species
Figure 47, map 11, table 1, plates 16, 17, 47D

DIAGNOSIS: Recognized by the moderately elongate oval body, dorsum (excluding membrane) with numerous distinct light brown spots, spotted tibiae (pl. 16), and apical endosomal spines of distinctly unequal length (fig. 27, pl. 17). Female ovoid. Most easily confused with *H. atriplicis* based on the pale coloration and spotted dorsum, but in *H. atriplicis* dorsum with blotches rather than spots, membrane with blotches, and endosomal spines subequal in length (pl. 17).

DESCRIPTION: *MALE*: Mean total length 3.34, mean pronotum width 1.04. COLORATION (pl. 16): Overall coloration mostly pale with contrasting light brown spots on dorsum, excluding membrane; antennae and legs pale; femora with contrasting dark spots, tibial spines with dark bases. SURFACE AND VESTITURE (pl. 16): Dorsum with woolly sericeous setae and some reclining, pale common setae. STRUCTURE (pl. 16): Elongate ovoid. **Head:** Head short and moderately broad, eyes moderately bulging; eye occupying one-half height of head; antenna inserted just above ventral margin of eye, eye weakly emarginate above insertion; antennal segment 2 elongate, slender (1.06), 1.28 times width of head; labium reaching to about midpoint of abdomen. **Thorax:** Pronotum with lateral margins weakly convex, calli weakly demarcated along posterior margin, posterior margin of pronotum straight; mesoscutum moderately exposed. *Hemelytron*: Costal margin weakly convex. GENITALIA (fig. 47, pl. 17): As in generic description but with the following details. **Pygophore:** Ventral surface with relatively few stout, pale bristles. **Endosoma:** Dorsal apical spine straight with slightly expanded, broadly rounded, somewhat spatulate apex (in lateral view); subapically ventral apical spine bent laterad, apically parallel to and one-half length of dorsal apical spine; secondary gonopore with a few denticles. **Parameres:** Left paramere with dorsoposterior surface elevated dorsad of posterior and anterior processes. Right paramere as in figure 47.

Female (pl. 16): Coloration as in male, body form somewhat more robust; mean total length 3.24, mean pronotum width 1.06. GENITALIA: As in plate 47D.

ETYMOLOGY: From the family name Chenopodiaceae, in reference to its exclusive occurrence on this host group.

HOSTS: Recorded from *Atriplex* sp., *Chenopodium curvispicatum, Enchylaena tomentosa, Maireana* sp., *Rhagodia spinescens, Sclerolaena limbata*, and *Threlkeldia* sp. (Chenopodiaceae). A significant number of specimens—including nymphs—were recorded as having been taken on *Olearia axillaris* (Asteraceae). Also recorded from *Senna* sp. (Fabaceae) and *Eremophila sturtii* (pl. 39C–E) (Scrophulariaceae), but these are likely sitting records or the result of commingling specimens in the field.

DISTRIBUTION (map 11): Widely distributed in Australia in areas with saline soils.

HOLOTYPE: **AUSTRALIA: South Australia:** Cadelga Homestead, 26.08949°S 140.4106°E, 150 m, 04 Nov 1998, Schuh, Cassis, Silveira, at light, 1♂ (AMNH_PBI 00136572) (SAMA).

PARATYPES: **AUSTRALIA: New South Wales:** 44.2 km E of Nyngan on Mitchell Hiway, 31.78335°S 147.612°E, 205 m, 11 Nov 2001, Cassis, Schuh, and Schwartz, *Chenopodium curvispicatum* Paul G. Wilson (Chenopodiaceae), det. NSW staff NSW666397, 1♂ (00413077), 2♀ (00413080, 00413081) (AMNH). **Northern Territory:** 10.4 km N of Ross Hiway on Arltunga Claraville Rd, 23.53334°S 134.509°E, 640 m, 26 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Rhagodia spinescens* R. Br. (Chenopodiaceae), det. NSW staff NSW658355, 1♀ (00413078) (AMNH). **Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, host unknown, 1♂ (00411926) (AMNH). 73.7 km E of Betoota, 25.60813°S 141.3999°E, 180 m, 03 Nov 1998,

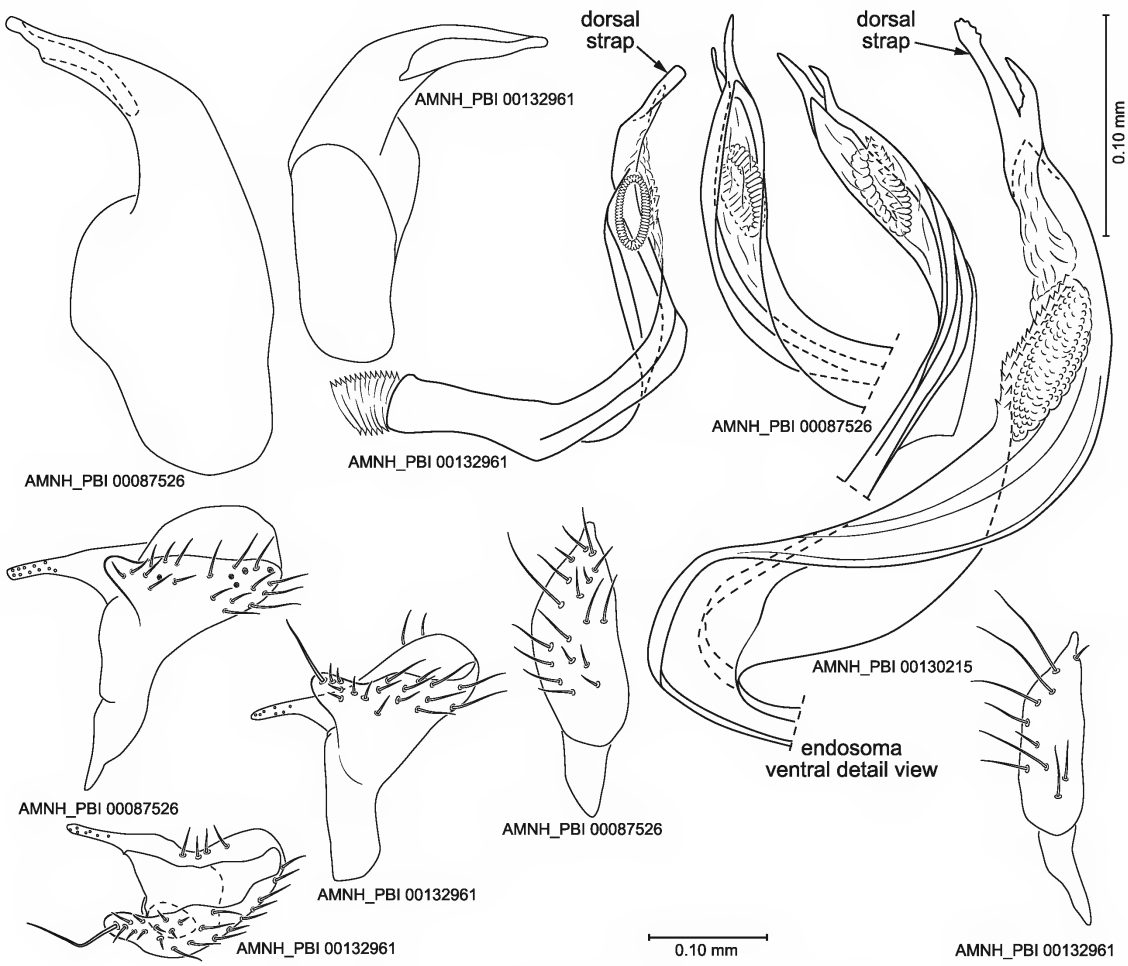


Fig. 47. Male genitalic structures of *Halophylus chenopodos*.

Schuh, Cassis, Silveira, 1♂ (00414645) (AMNH). **South Australia:** 12 km E of Copely, Flinders Range, 30.53334°S 138.5312°E, 322 m, 07 Nov 2001, Cassis, Schuh, and Schwartz, *Maireana* sp. (Chenopodiaceae), det. NSW staff NSW666352, 1♀ (00413079) (AMNH). 51 km NW of Morgan, 33.58334°S 140°E, 150 m, 01 Nov 1995, Schuh, Cassis, and Gross, 6♂ (00389867–00389872) at light, 9♂ (00132714–00132721, 00132959), 2♀ (00132722, 00132723) (AM), 1♂ (00087362), 1♀ (00087363), 3♂ (00132960,00132961, 00087552), 1♀ (00132962) (AMNH). 72 km N of Yunta, Nillinghoo Creek, 32.00924°S 139.4523°E, 194 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Atriplex* sp. (Chenopodiaceae), det. PERTH staff PERTH 05236630, 1♂ (00414644) (AM). Cadelga Homestead, 26.08949°S 140.4106°E, 150 m, 04 Nov 1998, Schuh, Cassis, Silveira, 3♂ (00389873–00389875), 5♀ (00389876–00389880) (AM), 1♂ (00087562) at light, 17♂ (00136559–00136568, 00136510–00136512, 00130213, 00130214, 00130216, 00087382), 17♀ (00136573–001365879, 00136583-00136585, 00136513–00136516, 00130217, 00130218, 00087383), 3♂ (00130215, 00136569, 00136603), 2♀ (00130219, 00130220) (AMNH), 2♂ (00136570, 00136571), 3♀ (00136580–00136582) (SAMA). Gammon Ranges National Park, Arcoona Creek, 2 km NE Owieandana OS, 30.434°S 138.977°E, 02 May 1989, J. Forrest & G.F. Gross, host undetermined, det. PERTH staff PERTH 05095182, 1♂ (00087313) (AM), *Eremophila sturtii* R. Br.

(Scrophulariaceae), det. NSW staff NSW666375, 1♂ (00087526) (AMNH). Maralinga Village, 30.158°S 131.579°E, Aug 1956 – Oct 1956, F.L. Hill, 1♂ (00174100), 1♀ (00174099) (BMNH). Witchelina Nature Reserve, Bushy Yowie Track, 30.1643°S 137.98397°E, 153 m, 21 Oct 2010, M. Elias, *Senna* sp. (Fabaceae), det. botanist, 1♂ (00414484), 1♀ (00414493) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02265°S 137.90282°E, 164 m, 13 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♂ (00414482) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.99611°S 138.07694°E, 180 m, 11 Oct 2010, A. Namyatova, *Sclerolaena limbata* (J. Black) Ulbr. (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 1♀ (00414487) (AMNH), 5♀ (00414486, 00414488–00414491) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.9768°S 138.08716°E, 149 m, 11 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♂ (00414483) (AMNH), host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♀ (00414492) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02083°S 138.04472°E, 212 m, 13 Oct 2010, A. Namyatova, 1♂ (00414480) (AMNH), 3♂ (00414479, 00414481, 00414485) (UNSW). **Western Australia:** 2.5 km W of Brand Hiway (off Red Emperor Rd), Flat Rocks Beach (S of Geraldton), 29.02061°S 114.7863°E, 22 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Olearia axillaris* (DC.) Benth. (Asteraceae), det. PERTH staff PERTH6989683, 3♂ (00414301–00414303), 8♀ (00414304, 00414305, 00414307–00414312) *Threlkeldia* sp. (Chenopodiaceae), det. PERTH staff PERTH6989551, 4♂ (00414262–00414265), 6♀ (00414266–00414271) (AM), *Olearia axillaris* (DC.) Benth. (Asteraceae), det. PERTH staff PERTH6989683, 3♂ (00414273, 00414274, 00414300), 3♀ (00414275, 00414276, 00414306) (AMNH). Fowlers Camp (at end of Fowlers Camp Rd), Shark Bay World Heritage Area, 26.10801°S 113.6167°E, 24 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Enchylaena tomentosa* R. Br. (Chenopodiaceae), det. PERTH staff PERTH6988008, 1♂ (00414352) *Enchylaena tomentosa* R. Br. (Chenopodiaceae), det. PERTH staff PERTH6988008, 2♂ (00414350, 00414351), 2♀ (00414355, 00414356) (AM).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 2.5 km W of Brand Hiway (off Red Emperor Rd), Flat Rocks Beach (S of Geraldton), 29.02061°S 114.7863°E, 22 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Olearia axillaris* (DC.) Benth. (Asteraceae), det. PERTH staff PERTH6989683, 5 nymphs (00414313–00414317) *Threlkeldia* sp. (Chenopodiaceae), det. PERTH staff PERTH6989551, 1 nymph (00414272) (AM). Fowlers Camp (at end of Fowlers Camp Rd), Shark Bay World Heritage Area, 26.10801°S 113.6167°E, 24 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Enchylaena tomentosa* R. Br. (Chenopodiaceae), det. PERTH staff PERTH6988008, 2 nymphs (00414353, 00414354) (AM).

Halophylus maireani, new species

Figure 48, map 11, table 1, plates 16, 17

Diagnosis: Recognized by dirty greenish to brown coloration, the elongate and nearly parallel-sided body form, tibiae with dark spots at the bases of spines (pl. 16); apical endosomal spines of equal length, moderately elongate, slender, one bent near base, the other near apex (fig. 48, pl. 17). Female brachypterous with hemelytron just reaching apex of abdomen, coloration green rather than brown as in male (pl. 16). Most easily confused with *H. tecticornii* on the basis of frequently brown coloration, but tibial spines with dark bases in *H. maireani* and pale in *H. tecticornii*; endosomal spines of unequal length in *H. tecticornii* (fig. 51, pl. 17). Females always green in *H. maireani* rather than brown as in *H. tecticornii* (pl. 16).

Description: *Male*: Mean total length 3.29, mean pronotum width 1.02. COLORATION (pl. 16): Overall coloration mostly dark, chocolate brown, sometimes lighter; membrane heavily fumose; antennae and femora dark; femora with contrasting dark (obscure because of dark background coloration) spots, tibiae pale, spines with dark bases. SURFACE AND VESTITURE (pl. 16): Body surface smooth, weakly shining, with woolly sericeous setae and some reclining, dark common setae. STRUCTURE (pl. 16): Body form elongate-rectangular. **Head:** Head short and broad, eyes moderately bulging; eye occupying one-half height of head; antenna inserted just below ventral margin of eye, eye weakly emarginate above

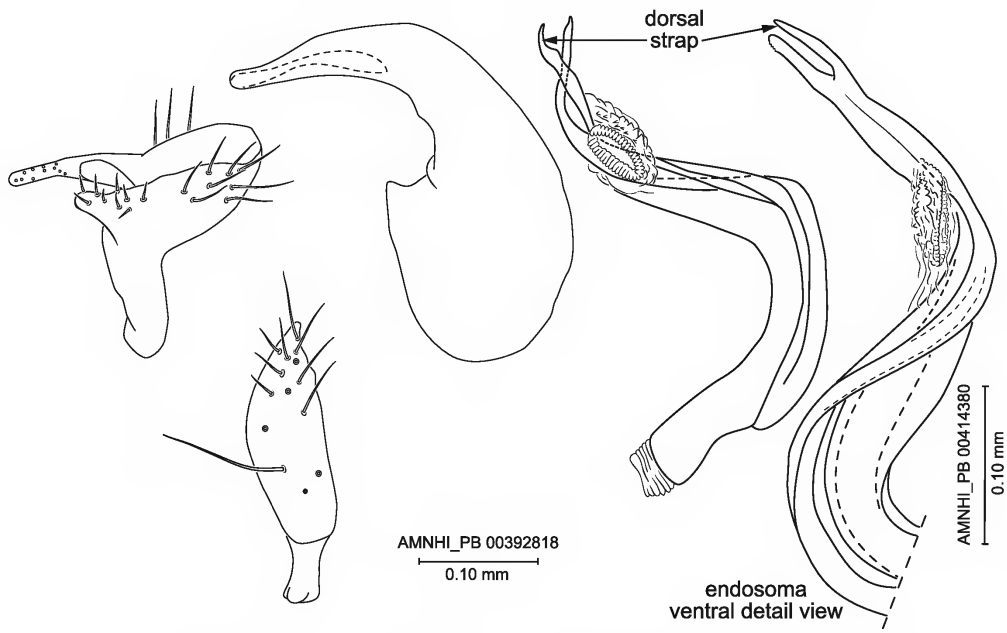


Fig. 48. Male genitalic structures of *Halophylus maireani*.

insertion; antennal segment 2 elongate, slender (1.18), 1.39 times width of head; labium reaching to about apex of metacoxa. **Thorax:** Pronotum weakly campanulate, with weakly concave sides, calli distinctly demarcated along posterior margin, posterior margin of pronotum straight; mesoscutum very narrowly exposed. *Hemelytron*: Costal margin nearly straight. GENITALIA (fig. 48, pl. 17): As in generic description but with the following details. **Pygophore:** Posteroventral surface with majority of setae consisting of stout dark spines. **Endosoma:** Dorsal apical spine gently curved ventrad, gradually attenuate to pointed apex; subapically ventral apical spine slightly bent laterad, apically parallel to and subequal in length to dorsal spine; secondary gonopore with fine denticles. **Parameres:** Left paramere with dorsoposterior surface somewhat elevated dorsad of posterior and anterior processes. Right paramere as in figure 48.

Female (pl. 16): Coloration usually much lighter than in male, greenish; strongly brachypterous, membrane abbreviated, just reaching apex of abdomen; mean total length 3.34, mean pronotum width 1.14.

Etymology: From the generic name *Maireana*, the halophytic host of this species.

Hosts: Recorded from *Maireana appressa*, *M. georgei*, *M. pyramidata*, *Sclerolaena limbata*, *and Tecticornia tenuis* (Chenopodiaceae). Also recorded from *Acacia* sp. (Fabaceae) although we believe this last record to be the result of mislabeling and/or commingling of specimens in the field.

Distribution (map 11): Widely distribution in Australia.

Holotype: **AUSTRALIA: Western Australia:** 17 km NE of Mingenew on Coalseam Rd, 29.07519°S 115.5423°E, 200 m, 10 Aug 2005, G. Cassis, *Maireana pyramidata* (Benth.) Paul G. Wilson (Chenopodiaceae), det. WA Herbarium PERTH 07620160, 1♂ (AMNH_PBI 00412821) (WAMP).

Paratypes: **AUSTRALIA: Northern Territory:** 26 km W of Henbury Homestead, 24.58944°S 132.99994°E, 457 m, 15 May 2013, M Cheng, *Tecticornia tenuis* (Benth.) K.A. Sheph. & Paul G. Wilson (Chenopodiaceae), det. NT Herbarium Staff – Alice Springs, 1♂ (00414455), 1♀ (00414458) (AMNH), 3♂ (00414453, 00414454, 00414456), 1♀ (00414457) (UNSW). Running Waters, 44.5 km NW of Henbury Homestead, 24.30833°S 132.90333°E, 480 m, 20 May 2013,

M. Cheng, host undetermined, 1♂ (00414452) (UNSW). **South Australia:** Witchelina Nature Reserve, Bushy Yowie Track, 30.12073°S 137.9233°E, 132 m, 19 Oct 2010, M. Elias, *Acacia* sp. (Fabaceae), det. Field ID, 1♂ (00414417) (UNSW). Witchelina Nature Reserve, Tea Tree Swamp, 30.0726°S 137.07688°E, 98 m, 21 Oct 2010, M. Elias, 1♂ (00414416), 1♂ (00414430), 2♀ (00414502, 00414503) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.095°S 138.13583°E, 116 m, 14 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 3♂ (00414423, 00414424, 00414440), 2♀ (00414447, 00414 448) (AMNH), Cassis Lab, UNSW – Bush Blitz, 2♀ (00414449, 00414450) (SAMA), Cassis Lab, UNSW – Bush Blitz, 5♂ (00414419–00414422, 00414425), 5♀ (00414439, 00414441, 00414445, 00414446, 00414438) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.15335°S 137.9362°E, 149 m, 12 Oct 2010, A. Namyatova, *Maireana appressa* Paul G. Wilson (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 1♀ (00414433), 1♂ (00414510) (AMNH), *Maireana appressa* Paul G. Wilson (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 1♀ (00414451), 1♂ (00414508) (SAMA), *Maireana appressa* Paul G. Wilson (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 6♂ (00414427, 00414429, 00414431, 00414505–00414507), 6♀ (00414432, 00414436, 0041 4437, 00414442–00414444) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.94485°S 138.0795°E, 132 m, 11 Oct 2010, A. Namyatova, host undetermined, 1♂ (00414509) (AMNH), host undetermined, 1♂ (00414504) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.15165°S 137.89847°E, 129 m, 12 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♂ (00414415) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.99611°S 138.07694°E, 180 m, 11 Oct 2010, A. Namyatova, *Sclerolaena limbata* (J. Black) Ulbr. (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 2♂ (00414519, 00414520) (AMNH), *Sclerolaena limbata* (J. Black) Ulbr. (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 2♂ (00414521, 00414522) (SAMA), *Sclerolaena limbata* (J. Black) Ulbr. (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 2♂ (00414418, 00414428) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02083°S 138.04472°E, 212 m, 11 Oct 2010, A. Namyatova, 1♀ (00414500) (AMNH), 1♂ (00414499), 1♀ (00414501), host undetermined, 1♂ (00414426), 2♀ (00414434, 00414435) (UNSW); 13 Oct 2010, A. Namyatova, 8♂ (00414511–00414518) (UNSW). **Western Australia:** 17 km NE of Mingenew on Coalseam Rd, 29.07519°S 115.5423°E, 200 m, 10 Aug 2005, G. Cassis, *Maireana pyramidata* (Benth.) Paul G. Wilson (Chenopodiaceae), det. WA Herbarium PERTH 07620160, 5♂ (00412817–00412820, 00412822), 4♀ (00391068, 00391069, 00412831, 00412832) (AM), 7♂ (00391067, 00412825–00412829, 00392818). 4♀ (00412835–00412838) (AMNH), 2♂ (00412823, 00412824), 2♀ (00412833, 00412834) (WAMP). Pilbara Dist., Marble Bar Rd, 30 km N of Newman, 23.21953°S 119.9035°E, 482 m, 29 May 1999, G.Cassis, R.Silveira, *Maireana georgei* (Diels) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH5636418, 4♂ (00414318–00414321), 2♀ (00414323, 00414324) (AM), 1♂ (00414322) (WAMP).

Other Specimens Examined: **AUSTRALIA: Northern Territory:** 26 km W of Henbury Homestead, 24.58944°S 132.99994°E, 457 m, 15 May 2013, M Cheng, *Tecticornia tenuis* (Benth.) K.A. Sheph. & Paul G. Wilson (Chenopodiaceae), det. NT Herbarium Staff – Alice Springs, 2 nymphs (00414459, 00414460) (UNSW). **Western Australia:** 17 km NE of Mingenew on Coalseam Rd, 29.075196S 115.54236E, 200 m, 10Aug 2005, G. Cassis, *Maireana pyramidata* (Benth.) Paul G. Wilson (Chenopodiaceae),det. WA Herbarium PERTH 07620160, 1 nymph (00412830) (AMNH). Pilbara Dist., Marble Bar Rd, 30 km N of Newman, 23.21953°S 119.9035°E, 482 m, 29 May 1999, G.Cassis, R.Silveira, *Maireana georgei* (Diels) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH5636418, 3 nymphs (00414325–00414327) (AM).

Halophylus rhagodii, new species
Figure 49, map 12, table 1, plates 16, 17

Diagnosis: Recognized by generally light green to pale coloration of uneven intensity across body surface and wings, elongate oval

body, dark spots as bases of tibial spines (pl. 16), and endosoma with one apical spine distinctly hooked and secondary gonopore weakly sclerotized (fig. 49, pl. 17). Body form of female somewhat more robust than in male. Distinguished from *H. maireani* and *H. tecticornii* by the frequently brownish coloration in the males of those species (pl. 16) and the detailed structure of the apical endosomal spines, particularly the distinctively hooked spine in *H. rhagodii* (pl. 17), a form similar to that seen in most *Pulvillophylus* spp. (pl. 27).

DESCRIPTION: *MALE*: Mean total length 3.80, mean pronotum width 1.08. COLORATION (pl. 16): Overall coloration mostly pale to light green, forming a variegated pattern, membrane with a distinct dark spot at apex of cells; antennae and legs pale; femora with contrasting dark spots, tibial spines with dark bases. SURFACE AND VESTITURE (pl. 16): Dorsum with woolly sericeous setae and some reclining, pale common setae. STRUCTURE (pl. 16): Body form elongate ovoid; eye occupying slightly less than two-thirds height of head; antenna inserted just above ventral margin of eye, eye very weakly emarginate above insertion; antennal segment 2 elongate, slender (1.14), 1.34 times width of head; labium reaching apex of mesocoxa. **Thorax:** Pronotum with lateral margin distinctly convex, calli weakly demarcated along posterior margin, posterior margin straight; mesoscutum moderately exposed. *Hemelytron*: Costal margin weakly convex. GENITALIA (fig. 49, pl. 17): As in generic description but with the following details. **Pygophore:** Ventral surface with suberect pale bristles. **Endosoma:** Dorsal strap notched at level of secondary gonopore, serrate (denticulate) at terminus; secondary gonopore weakly sclerotized, with a region of stout denticles. Dorsal apical spine weakly sclerotized short and straight, somewhat rounded apically; ventral apical spine strongly bent laterad before apex, of broader diameter apically, with parallel orientation and length equal to dorsal apical spine. **Parameres:** Left paramere small, posterior and anterior processes short. Right paramere with short medial spine apically. Right paramere as in figure 49.

Female (pl. 16): Coloration as in male, body form somewhat more robust; mean total length 3.17, mean pronotum width 1.07.

ETYMOLOGY: From the generic name *Rhagodia*, one of the halophytic hosts of this species.

HOSTS: Recorded from *Maireana appressa*, *Rhagodia* latifolia, and *R. preissii* (Chenopodiaceae).

DISTRIBUTION (map 12): Known from widely separated localities in South Australia and Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** Useless Loop Rd ca. 20 km W of jct with Shark Bay Rd, 26.56331°S 113.9338°E, 30 m, 25 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Rhagodia latifolia* (Benth.) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH6987605, 1♂ (AMNH_PBI 00414358) (WAMP).

PARATYPES: **AUSTRALIA: South Australia:** Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.01028°S 137.77611°E, 209 m, 13 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♀ (00414529) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.15335°S 137.9362°E, 149 m, 12 Oct 2010, A. Namyatova, *Maireana appressa* Paul G. Wilson (Chenopodiaceae), det. Peter Lang – Dept. of Env. & Natural Resources, South Australia, 2♀ (00414527, 00414528) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.94485°S 138.0795°E, 132 m, 11 Oct 2010, A. Namyatova, host undetermined, 2♀ (00414525, 00414526) (UNSW). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02083°S 138.04472°E, 212 m, 11 Oct 2010, A. Namyatova, host undetermined, 1♀ (00414524) (UNSW); 13 Oct 2010, A. Namyatova, 1♂ (00414523) (UNSW). **Western Australia:** 2.5 km W of Brand Hiway (off Red Emperor Rd), Flat Rocks Beach (S of Geraldton), 29.02061°S 114.7863°E, 22 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Rhagodia preissii* Moq. subsp. *obovata* (Chenopodiaceae), det. PERTH staff PERTH6989543, 3♂ (00414382, 00414383, 00414391), 7♀ (00414384–00414386, 00414395, 00414397, 00414399, 00414400) (AM), 3♂ (00414380, 00414381, 00414390), 2♀ (00414396, 00414398) (AMNH), 2♀ (00414387, 00414401), 1♂ (00414392) (WAMP). 26 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.26835°S 113.8491°E, 15 m, 25 Oct 2004,

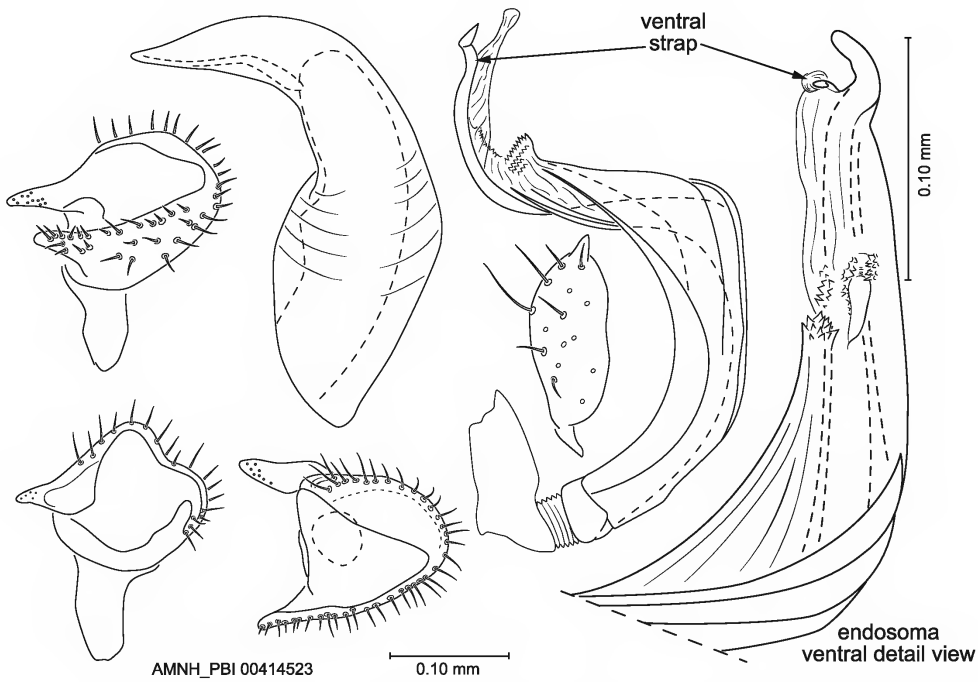


Fig. 49. Male genitalic structures of *Halophylus rhagodii*.

Cassis, Wall, Weirauch, Symonds, *Rhagodia latifolia* (Benth.) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH6987915, 1♂ (00414347) (AMNH). 27.6 km N of Coral Bay Rd on Cardabia-Ningaloo Rd, 22.90198°S 113.8167°E, 25 m, 29 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Rhagodia preissii* Moq. subsp. *obovata* (Chenopodiaceae), det. PERTH staff PERTH 6989306, 6♂ (00412880–00412883, 00414348, 00412884), 4♀ (00412885–00412888) (AMNH), 1♀ (00412889) (WAMP). 79 km W of Sandstone, 28.03737°S 118.4983°E, 650 m, 26 Oct 1996, Schuh and Cassis, 1♀ (00414349) (AMNH). Fowlers Camp (at end of Fowlers Camp Rd), Shark Bay World Heritage Area, 26.10801°S 113.6167°E, 24 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Rhagodia latifolia* (Benth.) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH6987907, 2♂ (00414340, 00414341), 2♀ (00414342, 00414343) (AMNH). Useless Loop Rd ca. 20 km W of jct with Shark Bay Rd, 26.56331°S 113.9338°E, 30 m, 25 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Rhagodia latifolia* (Benth.) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH6987605, 3♂ (00414357, 00414359, 00414360), 3♀ (00414364–00414366) (AM), 3♀ (00414361–00414363) (AMNH), 1♀ (00414367) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 2.5 km W of Brand Hiway (off Red Emperor Rd), Flat Rocks Beach (S of Geraldton), 29.02061°S 114.7863°E, 22 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Rhagodia preissii* Moq. subsp. *obovata* (Chenopodiaceae), det. PERTH staff PERTH 6989543, 4 nymphs (00414388, 00414389, 00414393, 00414394) (AM). Useless Loop Rd ca. 20 km W of jct with Shark Bay Rd, 26.56331°S 113.9338°E, 30 m, 25 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Rhagodia latifolia* (Benth.) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH6987605, 6 nymphs (00414368–00414373) (AM).

Halophylus salsoli, new species
Figure 50, map 12, table 1, plates 16, 17

Diagnosis: Recognized by almost uniformly pale coloration without spots or blotches on dorsum, tibial spines without dark bases, the sometimes diffuse dark marking at apex of clavus and at apex of membrane cells

(pl. 16); structure of endosoma as in figure 50 and plate 17. Body form in female similar to that of male. Endosomal structure and bristles on ventral surface of pygophore most similar to *H. tecticornii*, but that species mostly dark brown and with bristles on pygophore more numerous and darker than in to *H. salsoli* (pl. 16).

Description: *Male*: Mean total length 3.17, mean pronotum width 0.95. COLORATION (pl. 16): Overall coloration mostly pale, including membrane; antennae and legs pale; femora with contrasting dark spots, tibial spines without dark bases. SURFACE AND VESTITURE (pl. 16): Dorsum with woolly sericeous setae and some reclining, pale common setae. STRUCTURE (pl. 16): Body form elongate ovoid. **Head:** Head short and broad, eyes moderately bulging; eye occupying one-half height of head; antenna inserted at ventral margin of eye, eye very weakly emarginate; antennal segment 2 elongate, slender (1.11), 1.32 times width of head; labium reaching apex of metacoxa. **Thorax:** Pronotum with convex sides, calli very weakly demarcated along posterior margin, posterior margin weakly concave; mesoscutum moderately exposed. *Hemelytron*: Costal margin weakly convex. GENITALIA (fig. 50, pl. 17): As in generic description but with the following details. **Pygophore:** Ventral surface with some prominent stout pale bristles. **Endosoma:** Dorsal apical spine short, straight and pointed; ventral apical spine subapically gently bent laterad, apically parallel to and twice as long as dorsal apical spine; secondary gonopore with many strong denticles. **Parameres:** Left paramere with dorsoposterior surface elevated above posterior and anterior processes. Right paramere with short medial spine apically. Right paramere as in figure 50.

Female (pl. 16): Coloration as in male; differing from male as in generic description; mean total length 3.14, mean pronotum width 1.01.

Etymology: From the generic name *Salsola*, in reference to its occurrence on that plant genus.

Host: Recorded from *Salsola kali* (pl. 32D) (Chenopodiaceae).

Distribution (map 12): Known from interior areas of South Australia and New South Wales.

Holotype: **AUSTRALIA: South Australia:** 20 km NW of Innamincka, Innamincka Reg. Res., 27.60897°S 140.6333°E, 170 m, 05 Nov 1998, Schuh, Cassis, Silveira, *Salsola kali* L. (Chenopodiaceae), det. Royal Bot Gard. NSW, 1♂ (AMNH_PBI 00389420) (SAMA).

Paratypes: **AUSTRALIA: New South Wales:** Narrabri, 30.32466°S 149.78183°E, 215 m, 25 Jan 1960, M.I. Nikitin, 14♂ (00174030–00174043), 5♀ (00174044–00174048) (BMNH); 26 Jan 1960, M.I. Nikitin, 22♂ (00174050–00174071), 9♀ (00174072–00174080) (BMNH). Narrabri, Valley of Namoi River, 30.32466°S 149.94849°E, 215 m, 25 Jan 1960, M.I. Nikitin, 1♂ (00174049) (BMNH). **South Australia:** 1 km N of Innamincka, Cooper Creek, 27.73124°S 140.7364°E, 120 m, 05 Nov 1998, Schuh, Cassis, Silveira, 2♂ (00389881, 00389882) (AM). 20 km NW of Innamincka, Innamincka Reg. Res., 27.60897°S 140.6333°E, 170 m, 05 Nov 1998, Schuh, Cassis, Silveira, *Salsola kali* L. (Chenopodiaceae), det. Royal Bot Gard. NSW, 20♂ (00389421–00389432, 00389435–00389437, 00087129, 00087435, 00389883–00389885), 10♀ (00389439–00389447, 00087130) (AM), 2♂ (00389433, 00389434), 2♀ (00389448, 00389449) (SAMA). 51 km NW of Morgan, 33.58334°S 140°E, 150 m, 01 Nov 1995, Schuh, Cassis, and Gross, 1♂ (00414402) (AM). Cadelga Homestead, 26.08949°S 140.4106°E, 150 m, 04 Nov 1998, Schuh, Cassis, Silveira, 15♂ (00087561, 00130704, 00130705, 00389961–00389972), 6♀ (00389973–00389978) at light, 1♂ (00087380), 1♀ (00087381) (AM), 8♂ (00130702, 00130703, 00130706–00130711), 7♂ (00136586–00136592), 6♀ (00136594–00136599) (AMNH), 1♂ (00136593), 1♀ (00136600) (SAMA). **Victoria:** Neds Corner, 500 m N from major intersection past homestead – nr Pitfall Traps 11+12, 34.13566°S 141.30888°E, 28 Nov 2011, M. Cheng & L. Durber, 2♂ (UNSW_ENT 00025041, UNSW_ENT 00025042), 2♀ (UNSW_ENT 00025044, UNSW_ENT 00025045) (UNSW).

Other Specimens Examined: **AUSTRALIA: South Australia:** 20 km NW of Innamincka, Innamincka Reg. Res., 27.60897°S 140.6333°E, 170 m, 05 Nov 1998, Schuh, Cassis, Silveira, *Salsola kali* L. (Amaranthaceae), det. Royal Bot Gard. NSW, 1 nymph (00389438) (AM).

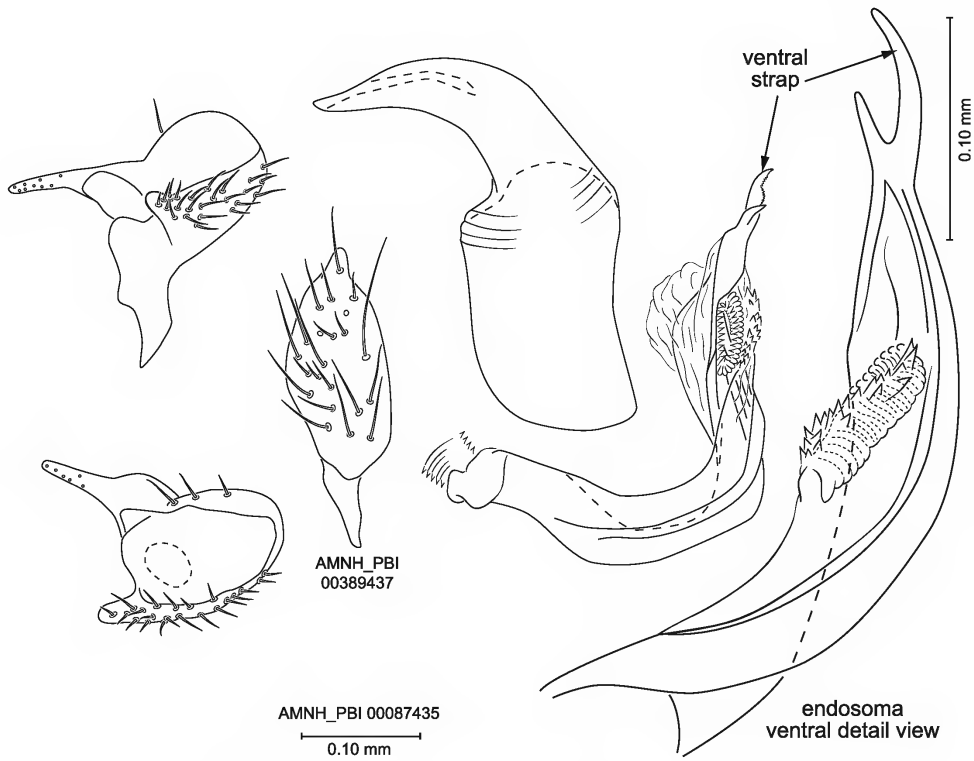


Fig. 50. Male genitalic structures of *Halophylus salsoli*.

Halophylus tecticornii, new species
Figures 45, 51, map 12, table 1, plates 16, 17, 47A–C, E

DIAGNOSIS: Recognized by largely brown coloration, short to moderately elongate and weakly ovoid body form, and tibial spines without dark bases (pl. 16); apical endosomal spines moderately elongate, of unequal length, shorter spine curving over entire length, longer spine with a small tooth near apex (fig. 51, pl. 17). Female brachypterous, but hemelytron always exceeding apex of abdomen; coloration as in male. Most easily confused with *H. maireani* on basis of frequently brown coloration in males, but females always green in *H. maireani* rather than brown as in *H. tecticornii*, tibial spines with dark bases (pl. 16), and endosomal spines of nearly equal length in *H. maireani* (pl. 17).

DESCRIPTION: *MALE*: Mean total length 3.50, mean pronotum width 1.21. COLORATION (pl. 16): Overall coloration mostly dark, chocolate brown; membrane heavily fumose; antennae and femora dark; femora with contrasting dark (obscure because of dark background coloration) spots, tibial spines without dark bases. SURFACE AND VESTITURE (fig. 45A–C, E, pl. 16): Body surface smooth and weakly shining; dorsum with woolly sericeous setae and some reclining, dark common setae. STRUCTURE: Body form elongate, rectangular. **Head:** Head short and broad, eyes bulging; eye occupying two-thirds height of head; antenna inserted at ventral margin of eye, eye very weakly emarginate above insertion; antennal segment 2 elongate, slender (1.21), 1.22 times width of head; labium just surpassing posterior margin of mesosternum. Pronotum weakly campanulate, with weakly concave sides, calli distinctly demarcated along posterior margin, posterior margin of pronotum concave; mesoscutum rather broadly exposed. *Hemelytron*: Costal margin nearly straight. GENITALIA (figs.

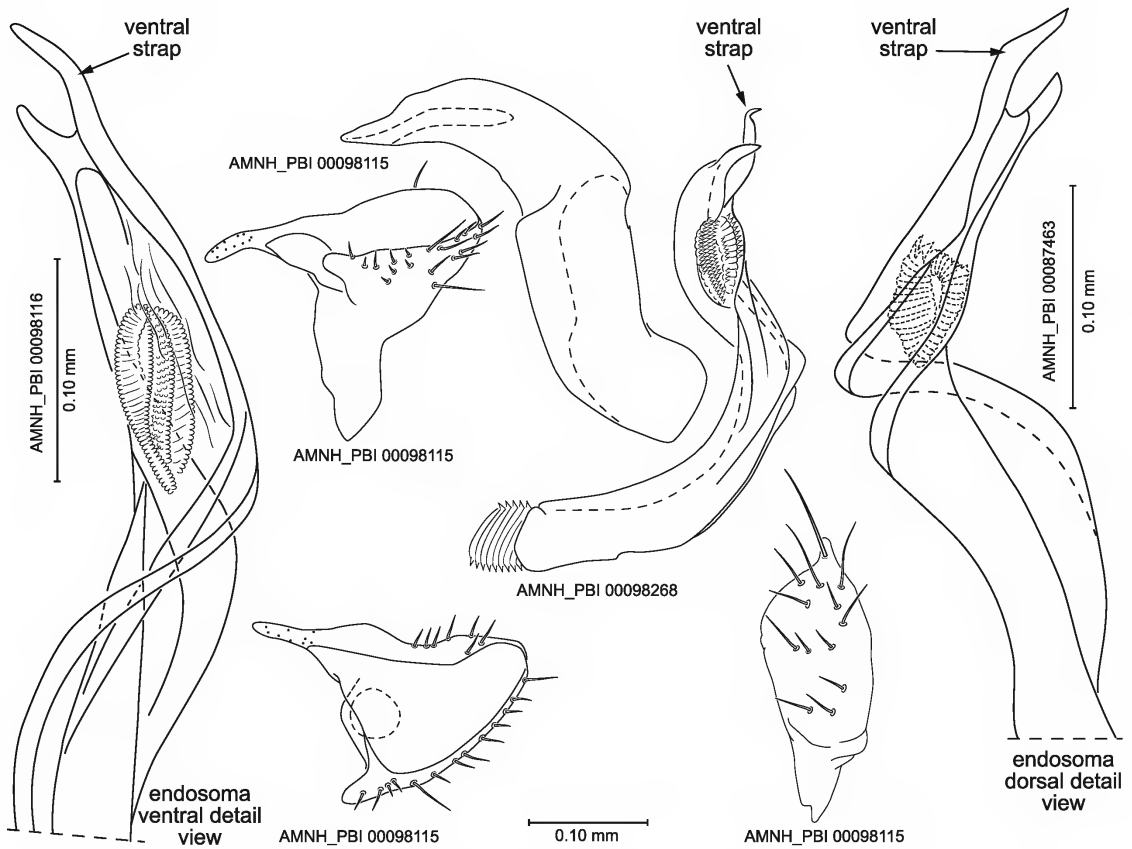


Fig. 51. Male genitalic structures of *Halophylus tecticornii*.

45, D, 51, pl. 17): As in generic description but with the following details: **Pygophore:** Ventral surface with many prominent stout dark bristles. **Endosoma:** Dorsal apical spine short, gently deflected, and pointed apically; ventral apical spine subapically gently bent laterad, apically slightly deflected, parallel to and twice as long as dorsal apical spine; secondary gonopore without denticles. **Parameres:** Left paramere with dorsoposterior surface somewhat elevated above posterior and anterior processes; posterior process deflected laterally. Right paramere as in figure 51.

Female (pl. 16): Coloration as in male; hemelytron brachypterous, membrane reduced and somewhat exceeding apex of abdomen; mean total length 3.86, mean pronotum width 1.31. GENITALIA: As in plate 47A–C, E.

Etymology: From the generic name *Tecticornia*, the halophytic host of this species.

Hosts: Recorded from *Arthrocnemum halocnemoides*, *Halosarcia indica*, *H. pterygosperma*, *Maireana oppositifolia*, and *Tecticornia disarticulata* (pl. 32E, F) (Chenopodiaceae). Also recorded from *Leptospermum erubescens* (Myrtaceae), but this is certainly an error in specimen handling.

Distribution (map 12): Widely distributed in areas of Australia with saline soils.

Holotype: **AUSTRALIA: South Australia:** 139.2 km SE of William Creek, Finnis Springs (63 km NW of Maree), 29.60001°S 137.4175°E, 21 m, 07 Nov 2001, Cassis, Schuh, and Schwartz, *Sclerostegia disarticulata* Paul G.Wilson (Chenopodiaceae), det. NSW staff NSW666337, 1♂ (AMNH_PBI 00098881) (SAMA).

Paratypes: **AUSTRALIA: South Australia:** 25 km E of Copely, Flinders Range, 30.51668°S 138.631°E, 450 m, 08 Nov 2001, Cassis, Schuh,

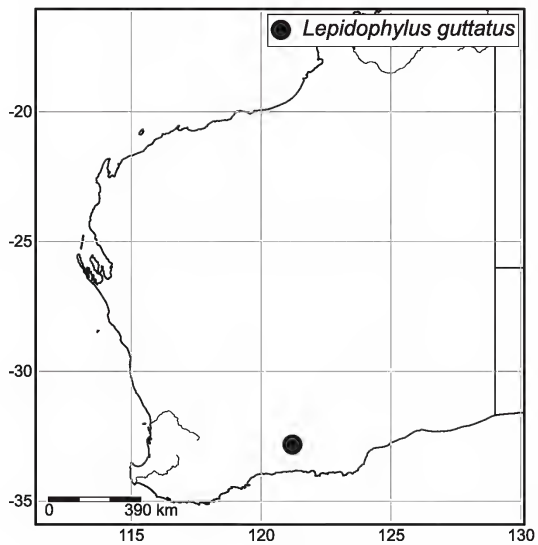
and Schwartz, *Sclerostegia disarticulata* Paul G. Wilson (Chenopodiaceae), det. NSW staff NSW666337, 11♂ (00098260–00098267, 00097143, 00098268, 00413020), 6♀ (00098269–00098271, 00098273, 00097144, 00098272) (AMNH). 139.2 km SE of William Creek, Finnis Springs (63 km NW of Maree), 29.60001°S 137.4175°E, 21 m, 07 Nov 2001, Cassis, Schuh, and Schwartz, *Sclerostegia disarticulata* Paul G. Wilson (Chenopodiaceae), det. NSW staff NSW666337, 1♂ (00391061) (AM), *Sclerostegia disarticulata* Paul G.Wilson (Chenopodiaceae), det. NSW staff NSW666337, 80♂ (00098145, 00098159–00098177, 00098091–00098114, 00058602, 00098823–00098845, 00098873–00098880, 00097134, 00098115, 00098116, 00413021), 72♀ (00098157, 00098182–00098205, 00098210, 00098211, 00098117–00098130, 00098850–00098867, 00098872, 00098882–00098888, 00097135, 00098131, 00098132) (AMNH), 2♂ (00098846, 00098847), 2♀ (00098868, 00098869) (ANIC), 2♂ (00098180, 00098181), 2♀ (00098208, 00098209) (CNC), 4♂ (00098142–00098144, 00098146), 11♀ (00098147–00098156, 00098158) (SAMA), 2♂ (00098848, 00098849), 2♀ (00098870, 00098871) (USNM), 2♂ (00098178, 00098179), 2♀ (00098206, 00098207) (ZISP). **Victoria:** 27 km W of Hattah, Murray Sunset National Park, 34.73835°S 142.01°E, 45 m, 03 Nov 2002, Cassis, Schuh, Schwartz, Silveira, *Halosarcia indica* (Willd.) Paul G. Wilson (Chenopodiaceae), det. NSW staff NSW658086, 3♀ (00412813–00412815) (AMNH). 41.8 Km W of Hattah, Murray Sunset National Park, 34.80035°S 141.919°E, 53 m, 03 Nov 2002, Cassis, Schuh, Schwartz, Silveira, *Halosarcia indica* (Willd.) Paul G. Wilson (Chenopodiaceae), det. NSW staff NSW658086, 3♂ (00412808–00412810), 2♀ (00412811, 00412812) (AMNH). Neds Corner, Loop track nr Red Rise Track, 34.17991°S 141.47116°E, 34 m, 29 Nov 2011, M. Cheng, L. Durber & P. Simper, sp. not determined (Chenopodiaceae), det. V. Stajsic (RBG Melb), 1♂ (UNSW_ENT 00025037) (UNSW). **Western Australia:** 4.2 km SE of Esperance, Lake Mullet Nature Reserve, 33.79691°S 121.95427°E, 10 m, 23 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, 1♂ (00414346) (AM). 12 mi E Katanning, 29 Dec 1971, J.A. Slater, *Arthrocnemum halocnemoides* Nees var. *pterygospermum* (Chenopodiaceae), 2♂ (00412804, 00412805), 2♀ (00412806, 00412807) (AMNH). 22 km S of Watheroo, 30.43161°S 116.0438°E, 400 m, 02 Nov 1996, Schuh and Cassis, *Halosarcia indica* (Willd.) Paul G. Wilson *bidens* (Chenopodiaceae), det. PERTH staff PERTH 05236843, 9♂ (00389400–00389407, 00087202), 10♀ (00389408–00389416, 00087203), 1♂ (00087463) (AM), 10♂ (00134879–00134888), 15♀ (00134889–00134903) (AMNH). 26 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.26835°S 113.8491°E, 15 m, 25 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Halosarcia pterygosperma* (J.M.Black) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH6987923, 1♂ (00389417) (AM). 40 km N of Ravensthorpe, 33.31524°S 119.8151°E, 500 m, 05 Nov 1996, Schuh and Cassis, *Maireana oppositifolia* (F. Muell.) Paul G. Wilson (Chenopodiaceae), det. PERTH staff PERTH 05236630, 1♂ (00414642), 1♀ (00414643) (AM), 2♀ (00128824, 00128825) (AMNH). Carnarvon, Small Boat Harbour, 24.90044°S 113.6477°E, 26 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Halosarcia halocnemoides* (Nees) Paul G. Wilson subsp. *tenuis* (Chenopodiaceae), det. PERTH staff PERTH6989071, 1♂ (00389418), 1♀ (00389419) (AM). Charles Darwin Reserve, track to White Dam, 29.68594°S 116.92094°E, 307 m, 22 Sep 2009, C. Symonds, *Tecticornia disarticulata* (Paul G.Wilson) K.A. Sheph. & Paul G.Wilson (Chenopodiaceae), det. WA Herbarium, 1♂ (00414530) (UNSW). Pallarup Nature Reserve, west side, 33.26485°S 119.7565°E, 310 m, 05 Dec 1997, Schuh, Cassis, Brailovsky, Asquith, *Leptospermum erubescens* Schauer (Myrtaceae), det. PERTH staff PERTH 05056373, 2♂ (00414344, 00414345) (AM). ca. 107.7 km SE of North West Coastal Hiway, on Mardathuna Rd (W of Kennedy Range National Park), 24.66376°S 114.7821°E, 163 m, 01 Nov 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, 1♀ (00412816) (AMNH).

Lepidophylus, new genus

TYPE SPECIES: *Lepidophylus guttatus,* new species.

DIAGNOSIS: Recognized by the relatively small, compact, ovoid body form, weak sexual dimorphism, dorsum and femora densely covered with contrasting dark spots on weakly reddish-brown background, membrane marmorate, and dorsum and thoracic pleuron

densely covered with appressed lepidote setae (pl. 18); head very short and closely conforming to anterior margin of pronotum; clypeus and area between clypeus and eye highly polished and maroon, contrasting with surrounding areas; endosoma sigmoid, with three lobelike terminal projections, phallotheca with a dorsal keel, and right paramere tiny with fingerlike apex (fig. 52, pl. 18). Possibly confused with *Maculiphylus* on basis of size and spotted dorsum, but that taxon with pale background coloration, simple setae on dorsum, head not closely conforming to anterior margin of pronotum, much more pronounced sexual dimorphism (pl. 18), and a J-shaped endosoma with a terminal secondary gonopore and no apical elaborations (fig. 53); lepidote setae similar to those found in *Halophylus, Proteophylus grevilleae*, and *P. occidentalis*, and some *Pulvillophyus* spp., but coloration, including unique marmorate membrane in *Lepidophylus*, and structure of the male genitalia distinctive in each of these groups.



Map 13. Distribution of *Lepidophylus guttatus*.

DESCRIPTION: *MALE*: Total length 2.90–2.94, pronotum width 0.99–1.07. COLORATION (pl. 18): Overall coloration weakly reddish brown, appendages somewhat lighter, with contrasting, small, brown spots on dorsum and femora; clypeus and area between clypeus and eye highly polished and maroon, contrasting with surrounding pale areas; tibial spines with dark bases on all legs; membrane marmorate. SURFACE AND VESTITURE (pl. 18): Body surface, including abdomen, with lepidote sericeous setae and scattered, reclining, black bristlelike setae. STRUCTURE (pl. 18): Body form elongate ovoid. **Head:** Head short and moderately broad, vertex broad, eyes moderately bulging; eye occupying three-fifths height of head; antenna inserted at ventral margin of eye, unlike most Australian Cremnorrhinina antennal fossa removed from eye by about one-half diameter of fossa; antennal segment 2 short, stout, of uniform diameter (0.70), 0.86 times width of head; labium reaching to posterior margin of mesosternum. **Thorax:** Pronotum with sides nearly straight, calli indistinct, posterior margin of pronotum straight; mesoscutum broadly exposed. *Hemelytron*: Costal margin weakly convex. GENITALIA (fig. 52, pl. 18): **Pygophore:** Broadly triangular, posterior margin truncate; dorsal surface without tubercles or discrete groups of bristles. **Endosoma:** Sigmoid, straps continuous proximal to secondary gonopore, diverging distad of gonopore; interstrap region bounded marginally by dorsal and ventral straps forming two large, marginally serrate, attenuate blades, largest blade directed apicad, shorter blade directed ventrad, another shorter apically serrate, flattened projection originating opposite gonopore; secondary gonopore relatively small, well sclerotized situated subapically within interstrap region. **Phallotheca:** Apical portion broadly conical; dorsomedial surface with prominent crest; large ovoid aperture on anteroapical surface; basal portion reaching to middle of ventral pygophore surface in situ. **Parameres:** Left paramere typically phyline with middle of dorsoposterior margin strongly elevated above posterior and anterior processes; posterior process short, slightly deflected; anterior process small, prominent seta not observed. Right paramere minute, round with long, pointed, medially placed, apical projection.

FEMALE (pl. 18): Coloration and vestiture as in male, body slightly more broadly ovoid;

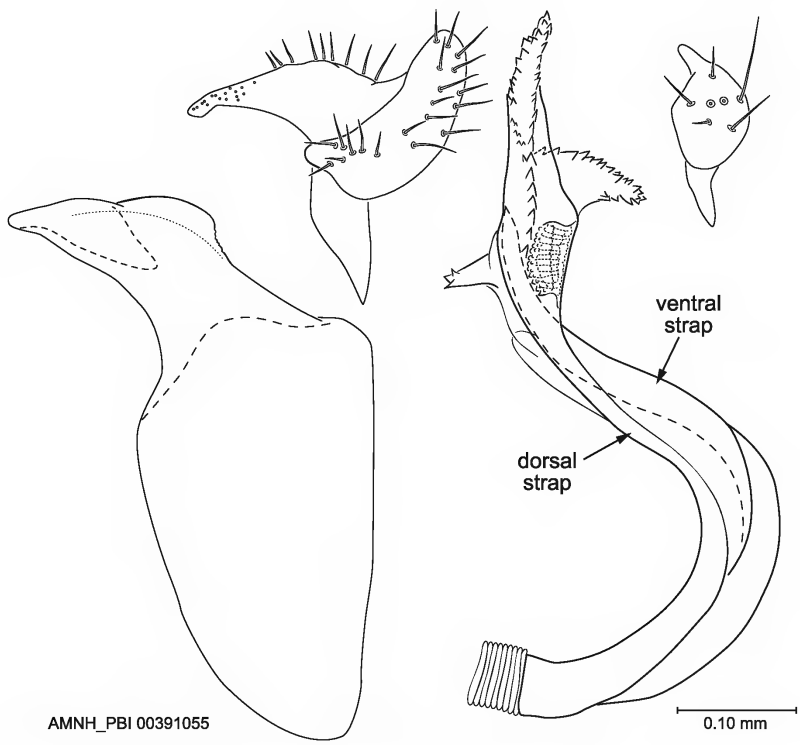


Fig. 52. Male genitalic structures of *Lepidophylus guttatus*.

total length 2.97, pronotum width 1.14. GENITALIA: Not examined.

Etymology: From the Greek, *lepis*, "scale," in reference to the scalelike setae, and the generic name *Phylus*; masculine.

Discussion: *Lepidophylus* shares the lepidote sericeous setae with *Halophylus* spp., *Proteophylus grevillea, P. occidentalis*, and several *Pulivillophylus* spp., and the spotted tibiae with several *Halophylus* spp. The structure of the endosoma is distinct in these taxa, however, suggesting that these similarities are the result of convergence.

Lepidophylus guttatus, new species
Figure 52, map 13, table 1, plate 18

Diagnosis: Known only from the type species and therefore recognized by the characters in the generic diagnosis.

Description: *Male* (pl. 18, fig. 52): As in generic description. Mean total length 2.92, mean pronotum width 1.03.

Female (pl. 18): As in generic description.

Etymology: From the Latin, *guttatus*, "spotted," in reference to the spotted dorsum.

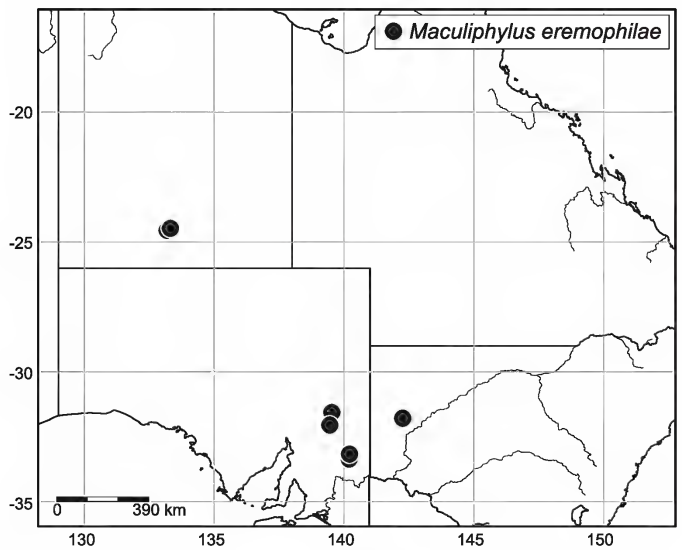
Host: Recorded from *Eremophila ionantha* (pl. 38C–E) (Scrophulariaceae).

Distribution (map 13): Known only from the type locality near Peak Charles National Park, southwest of Norseman, Western Australia.

Discussion: See generic discussion.

Holotype: **AUSTRALIA: Western Australia:** 4.3 km N of Peak Charles National Park, 32.81408°S 121.2114°E, 200 m, 20 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05670438, 1♂ (AMNH_PBI 00099397) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 4.3 km N of Peak Charles National Park, 32.81408°S 121.2114°E, 200 m, 20 Nov 1999, R. T. Schuh, G. Cassis, and R. Silveira, *Eremophila ionantha* Diels (Scrophulariaceae), det. PERTH staff PERTH 05670438, 1♀ (00099398), 1♂ (00391055) (AMNH).



Map 14. Distribution of *Maculiphylus eremophilae.*

Maculiphylus, new genus

TYPE SPECIES: *Maculiphylus eremophilae,* new species.

DIAGNOSIS: Recognized by the relatively small size, parallel-sided body form, exserted eyes, and small dark spots covering the pale dorsum (pl. 18); endosoma J-shaped with a terminal secondary gonopore and no apical elaborations (fig. 53, pl. 18), phallotheca with a dorsal keel, right parameres tiny with a laterally directed terminal projection (fig. 53), and female subgenital plate with posteriorly directed medial projection. Sexual dimorphism moderately strong, the female distinctly ovoid. Possibly confused with *Adunatiphylus* on basis of size and spotted dorsum, but that taxon with endosomal straps fused medially and apically forming a single, long, erect spine (fig. 2, pl. 1), whereas endosomal straps distinct over most of length, not forming a terminal spine, and secondary gonopore subapical in *Maculiphylus* (fig. 53, pl. 18). *Lepidophylus* also with spotted dorsum, but that species covered with lepidote setae.

DESCRIPTION: *MALE*: Total length 2.96–3.47, pronotum width 0.90–1.03. COLORATION (pl. 18): Body and most of appendages pale green to yellowish, hemelytron uniformly covered with weakly contrasting small gray-brown spots; membrane weakly infuscate, without markings. SURFACE AND VESTITURE (pl. 18): Surface smooth, dull; vestiture of reclining, pale, simple setae. STRUCTURE (pl. 18): **Head:** Transverse, vertex relatively narrow, eyes large, bulging, frons only weakly projecting in dorsal view; eye occupying two-thirds height of head, antenna inserted somewhat above ventral margin of eye, eye emarginate at fossa; antennal segment 2 relatively short, stout, of uniform diameter (0.85), 1.12 times width of head; labium reaching midpoint of mesosternum. **Thorax:** Pronotum weakly elongate, trapezoidal, nearly straight sided, calli very weakly expressed, posterior lobe moderately elevated, posterior margin very weakly concave; mesoscutum moderately exposed. *Hemelytron*: Moderately elongate, corium laterally nearly straight, cuneus relatively short. GENITALIA (fig. 53, pl. 18): **Pygophore:** Triangular; dorsal surface without tubercles or discrete groups of bristles. **Endosoma:** J-shaped, straps continuous from base to small membranous apex; secondary gonopore small, well sclerotized, subapically situated within interstrap region. **Phallotheca:** Apical portion conical; dorsomedial surface with discrete crest basad; narrowly elongate ovoid aperture on anterior dorsal surface; internal basal portion reaching to middle of ventral pygophore surface in situ. **Parameres:** Left paramere typically phyline with dorsoposterior margin slightly elevated

above posterior and anterior processes; posterior process short, slightly deflected; anterior process small, prominent seta not observed. Right paramere minute, fusiform with narrow pointed medial projection apically.

Female (pl. 18): Color, vestiture, and surface texture as in male; body more broadly ovoid, eyes smaller, and vertex relatively wider than in male; total length 2.77–3.03, pronotum width 0.92–1.05. GENITALIA (pl. 48): **Subgenital plate of sternite 6:** With posteriorly directed medial projection. **Vestibular sclerites:** Large, reaching to anterior margin of sclerotized rings. *First gonapophyses*: Relatively large, triangular basal blocks with concave margins. *Ventral labiate plate*: Platelike medial anteroventral extension reaching lateral extent of basal gonapophysal structures, anterior surface covering anterior surface of basal structures. **Dorsal labiate plate:** Large, long. *Sclerotized rings*: Weakly sclerotized, large, subovoid, slightly concave, relatively thin walled. *Posteromedial region*: Surface without conspicuous microstructure. *Anterolateral region*: Anterior margin extending beyond anterior edge of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Apparently not distinct from dorsal surface of connecting membrane. *Interramal sclerites*: With weakly sclerotized lateral sclerites, medial sclerite not apparent.

Etymology: From the Latin, *macula*, "spot," and the generic name *Phylus*; masculine.

Discussion: With respect to coloration and the spots on the dorsum and femora *Maculiphylus* is most similar to *Adunatiphylus*. Nonetheless, the structure of the male genitalia in the two taxa is strikingly different, and we therefore treat the two as distinct genera.

Maculiphylus eremophilae, new species
Figure 53, map 14, table 1, plates 18, 48

Diagnosis: Known only from the type species and therefore recognized by the characters in the generic diagnosis.

Description: *Male* (pl. 18, fig. 53): As in generic description. Mean total length 3.23, mean pronotum width 0.96.

Female (pl. 18): As in generic description. Mean total length 2.85, mean pronotum width 0.97. GENITALIA as in plate 48.

Etymology: From the generic name *Eremophila*, in reference to its host association.

Hosts: Recorded from *Eremophila caperata* (pl. 37A–C) and *E. sturtii* (pl. 39C–E) (Scrophulariaceae). Also recorded from *Parthenium hysterophorus* (Asteraceae).

Distribution (map 14): Known from interior New South Wales and adjacent areas of South Australia and the Northern Territory.

Discussion: See generic discussion.

Holotype: **AUSTRALIA: South Australia:** 14.3 km S of Erudina Woolshed, 31.53334°S 139.5506°E, 86 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♂ (AMNH_PBI 00097190) (SAMA).

Paratypes: **AUSTRALIA: New South Wales:** 77.2 km E of Broken Hill on Barrier Hiway, 31.76668°S 142.2592°E, 150 m, 10 Nov 2001, Cassis, Schuh, and Schwartz, *Parthenium hysterophorus* L. (Asteraceae), det. NSW staff NSW666375, 1♀ (00099321) (AM), *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♀ (00097193), 1♂ (00391092) 2♂ (00099318, 00099319), 4♀ (00099320, 00099322–00099324) (AMNH). **Northern Territory:** 3.6 km NW of Henbury Homestead, 1.5 km W from Stuart highway towards 3 Mile Creek, 24.52583°S 133.23306°E, 431 m, 16 May 2013, M. Cheng, C. Bayer & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 2♂ (00414535, 00414639) (AM), 2♂ (00414640, 00414614), 3♀ (00414615–00414617) (UNSW). 11.5 km NE of Henbury Homestead, 24.46528°S 133.31694°E, 441 m, 16 May 2013, M. Cheng, C. Bayer, & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♂ (00414536) (AM), *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♂ (00414641), 4♀ (00414610–00414613) (UNSW). Henbury Station, 14 km NE from Henbury Homestead, North of Chandler Range approx 2.3 km from Stuart Highway, 24.46556°S 133.35194°E, 549 m, 17 May 2013, M. Cheng & C. Duykers, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium

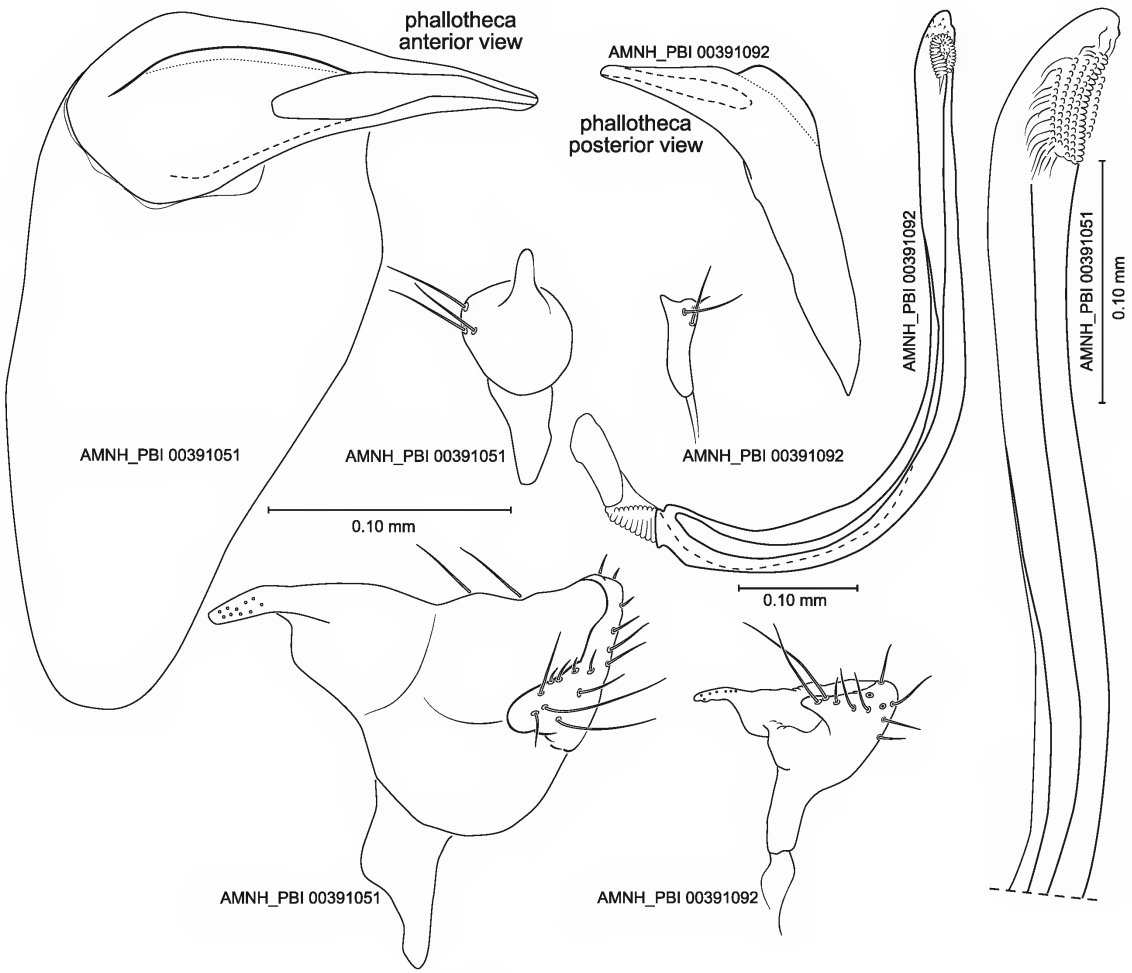


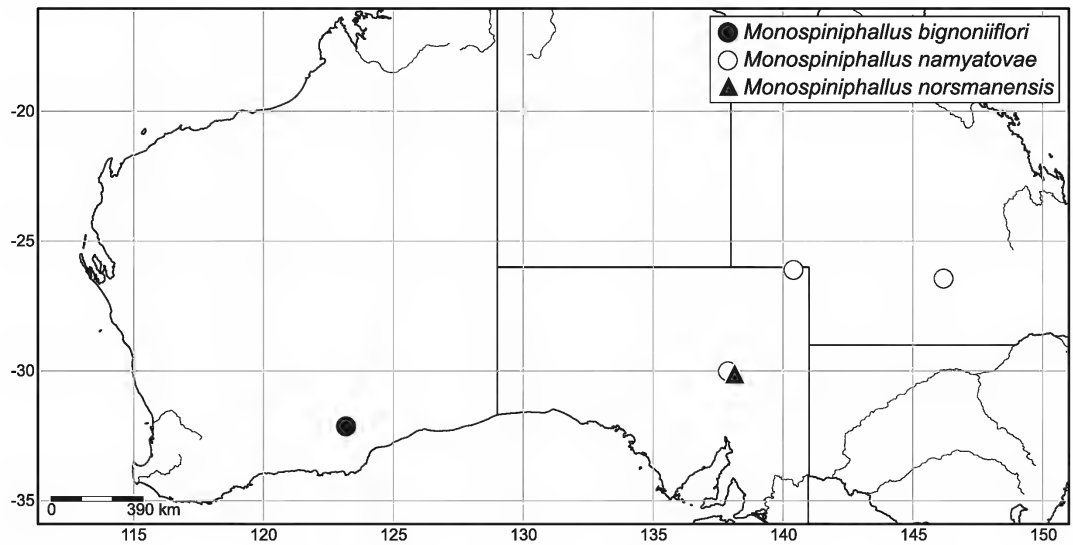
Fig. 53. Male genitalic structures of *Maculiphylus eremophilae.*

Staff – Alice Springs, 2♀ (00414618, 00414619) (AM), 1♂ (00414537), 1♀ (00414620) (UNSW). **South Australia:** 10.3 km W of Quondong Vale, 33.1137°S 140.2231°E, 100 m, 08 Nov 1996, Schuh and Cassis, *Eremophila caperata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05236592, 2♂ (00136699, 00136700), 5♀ (00136701–00136704, 00136707) (AMNH), 3♀ (00136705, 00136706, 00136708) (SAMA). 14.3 km S of Erudina Woolshed, 31.53334°S 139.5506°E, 86 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NSW staff NSW666375, 1♀ (00097191) (AM), 3♂ (00099246, 000 99247, 00391051) (AMNH). 72 km N of Yunta, Nillinghoo Creek, 32.00924°S 139.4523°E, 194 m, 09 Nov 2001, Cassis, Schuh, and Schwartz, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. Royal Botanic Garden NSW 666375, 1♂ (00413053) (AMNH). 96 km NW of Morgan, Pine Valley Stn, 33.31667°S 140.2°E, 150 m, 02 Nov 1995, Schuh, Cassis, and Gross, *Eremophila sturtii* R. Br. (Scrophulariaceae), 2♂ (00389 864, 00389865) (AM).

Monospiniphallus, new genus

Type Species: *Monospiniphallus bignoniiflori,* new species.

Diagnosis: Recognized by the variably shaped endosoma with a single, long, erect, apical spine, and elongate, nearly parallel-sided,



Map 15. Distribution of *Monospiniphallus* spp.

body form (figs. 54–56, pl. 18). Sexual dimorphism moderate, where known female more distinctly ovoid and with smaller eyes than male. Possibly confused with *Bifidostylus* and *Mrytophylus* spp. with a dorsum devoid of dark markings, but easily distinguished from both of those taxa by the single, long, apical endosomal spine, absence of a lateral endosomal spine, and the right paramere blunt or with a single process.

Description: *Male*: Total length 3.50–4.50, pronotum width 0.88–1.11. COLORATION (pl. 18): Varying from nearly uniform green, including appendages, to green with some broadly defined darker areas, never with a dark spot on corium at inner angle of cuneus and rarely with dark marking at apex of membrane cells, although membrane frequently infuscate. SURFACE AND VESTITURE (pl. 18): Body surface smooth, weakly shining; dorsum with moderately long reclining pale or dark common setae. STRUCTURE (pl. 18): **Head:** Eyes variable from small and beady with a relatively broad vertex, to large, bulging and with vertex relatively narrow; frons usually weakly swollen and only slightly protruding beyond anterior margin of eye; antennal segment 2 long, robust, of uniform diameter over entire length. **Thorax:** *Pronotum*: Relatively short, transverse, flat, calli often strongly defined across posterior margin; lateral margins nearly straight, posterior margin straight; mesoscutum narrowly exposed. *Hemelytron*: Relatively short to strongly elongate, usually nearly parallel sided with costal margin nearly straight; cuneus ranging from short and relatively broad to strongly elongate and slender. GENITALIA (figs. 54–56 pl. 18): **Pygophore:** Elongate triangular or bell shaped with broad posterior margin; dorsal surface without tubercles or conspicuous groups of bristles. **Endosoma:** C- or J-shaped, or sigmoid; dorsal and ventral straps adhered to one another from base to proximal to, or equal to, level of secondary gonopore; apically with one long pointed spine, usually with second shorter spine; secondary gonopore subapical, weakly developed or absent. **Phallotheca:** Apical portion narrowly conical or conical; dorsal surface without crest; aperture elongate ovoid to slit-like situated on dorsal anterior side; basal portion extending to middle of pygophore ventral surface in situ. **Parameres:** Left paramere typically phyline; dorsoposterior margin slightly elevated above posterior and anterior processes; posterior process with undulating lateral margin in dorsal view, apical portion usually straight or slightly deflected; anterior process slightly produced anteriad of paramere body or small, if prominent seta present then inserted on lobe. Right paramere small to moderately large; apically truncate

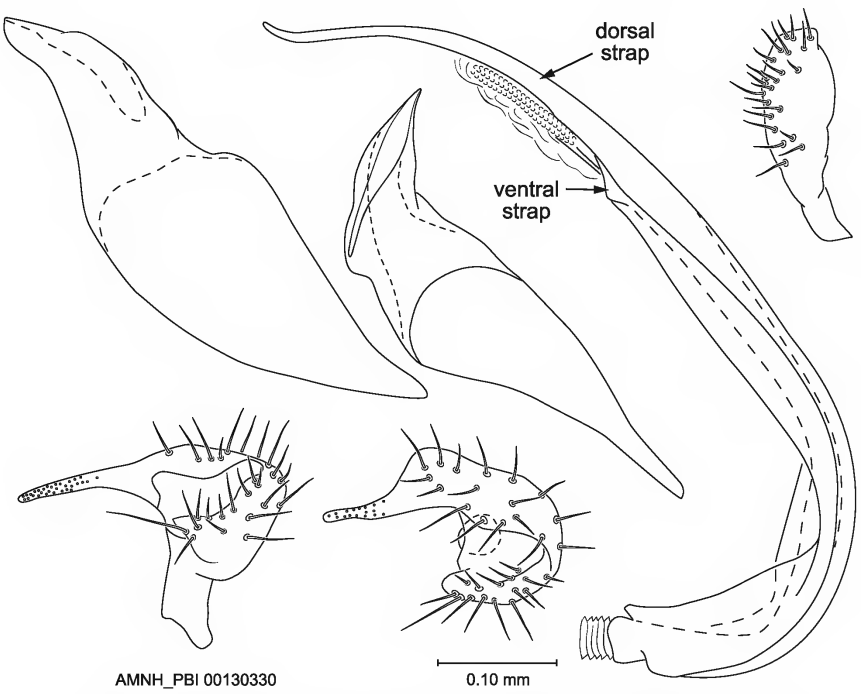


Fig. 54. Male genitalic structures of *Monospiniphallus bignoniiflori.*

with a short spine or more strongly lanceolate with a medial fingerlike process.

Female (pl. 18): Where known, coloration as in male; elongate ovoid, eyes smaller than in male and vertex wider; total length 3.61–3.95, pronotum width 1.04–1.10. GENITALIA: Not examined.

Etymology: From the Greek, *monos*, "one," the Latin, *spina*, "thorn," and *phallus*, in reference to the single spine arising from the apex of the endosoma.

Discussion: We assign three species to *Monospiniphallus* based on their possession of a rather simple endosoma with one prominent apical spine. Other attributes, however, such as coloration and structure of the right paramere show substantial variation, and females are unknown for two of the species. Further collecting and new information may alter our arguments for the monophyly of this grouping.

Monospiniphallus bignoniiflori, new species
Figure 54, map 15, table 1, plate 18

Diagnosis: Recognized by the relatively short and broad body form, uniform green coloration, bulging eyes, narrow vertex (pl. 18), and untwisted, J-shaped endosoma (fig. 54, pl. 18). Congeners with some variability in coloration and with at least modest twisting of endosoma.

Description: *Male*: Mean total length 3.67, mean pronotum width 1.04. COLORATION (pl. 18): Green, including all appendages, without markings; membrane pale, without markings. SURFACE AND VESTITURE (pl. 18): Dorsum smooth, weakly polished and shining; dorsal vestiture of reclining, black, simple setae. STRUCTURE: **Head** (pl. 18): Eyes large, protuberant; vertex relatively narrow; frons weakly swollen and slightly projecting beyond anterior margin of eye; eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye emarginate at fossa; antennal segment 2 relatively long (1.40), 1.67 time width of head; labium slightly surpassing midpoint of mesosternum. **Thorax** (pl. 18): As in generic description. *Hemelytron*: Relatively short; cuneus weakly elongate triangular. GENITALIA (fig. 54, pl. 18): **Pygophore:** Elongate triangular. **Endosoma:** J-shaped; straps laterally

compressed medially; dorsal strap long, extending beyond secondary gonopore as narrow distally flagellate spine; ventral strap terminating proximal to gonopore; secondary gonopore narrow, situated within thin membrane. **Phallotheca:** Apical portion narrowly conical; aperture elongate ovoid, situated on dorsal anterior side. **Parameres:** Left paramere with straight posterior process and small anterior process. Right paramere small, irregularly truncate apically, with a short projection on anterior angle.

Female (pl. 18): Coloration as in male; differing from male as in generic description; mean total length 3.84, mean pronotum width 1.07.

Etymology: Named after the host species *Eremophila bignoniiflora* (Scrophulariaceae).

Host: Recorded from *Eremophila bignoniiflora* (Scrophulariaceae).

Distribution (map 15): Known from near Charleville, southwestern Queensland and adjacent areas in South Australia.

Holotype: **AUSTRALIA: Queensland:** 10.8 km NW of Charleville, 26.44062°S 146.1584°E, 360 m, 01 Nov 1998, Schuh, Cassis, Silveira, *Eremophila bignoniiflora* (Benth.) F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427508, 1♂ (AMNH_PBI 00130328) (QM).

Paratypes: **AUSTRALIA: Queensland:** 10.8 km NW of Charleville, 26.44062°S 146.1584°E, 360 m, 01 Nov 1998, Schuh, Cassis, Silveira, *Eremophila bignoniiflora* (Benth.) F. Muell. (Scrophulariaceae), det. Royal Bot Gard. NSW NSW427508, 1♂ (00130329), 9♀ (00130331–00130333, 00130341–00130346) (AM), 2♂ (00130327, 00130330), 5♀ (00130335, 00130336, 00130338–00130340) (AMNH), 2♀ (00130334, 00130337) (QM). **South Australia:** Cadelga Homestead, 26.08949°S 140.4106°E, 150 m, 04 Nov 1998, Schuh, Cassis, Silveira, 1♂ (00136605) (AMNH). Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02265°S 137.90282°E, 164 m, 13 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW–Bush Blitz, 1♂ (00387484) (UNSW).

Monospiniphallus namyatovae, new species
Figure 55, map 15, table 1, plate 18

Diagnosis: Recognized by the elongate, relatively slender body form, yellow coloration (in preserved specimens), orange cuneus, weakly infuscate basal half of clavus and appendages, small beady eyes, broad vertex (pl. 18), and twisted weakly sigmoid endosoma (fig. 55, pl. 18). Distinguished from *M. bignoniiflori* by uniform green coloration and J-shaped, untwisted endosoma in that species (pl.18), and from *M. norsemanensis* by the infuscate pronotum, basal half of clavus, and appendages, the strongly infuscate membrane, and C-shaped (coiled) endosoma in that species (pl. 18).

Description: *Male:* Total length 4.25, pronotum width 0.99. COLORATION (pl. 18): General coloration yellow (in preserved specimens), cuneus orange, and basal half of clavus and appendages weakly infuscate. SURFACE AND VESTITURE (pl. 18): Dorsum smooth, weakly polished and shining; dorsal vestiture of reclining, pale, simple setae. STRUCTURE: **Head** (pl. 18): Eyes small, beady; vertex relatively broad; frons swollen, clypeus projecting beyond anterior margin of eye; eye occupying three-quarters height of head; antennae inserted just above ventral margin of eye; antennal segment 2 moderately long, stout, of uniform diameter (1.24), 1.80 times width of head; labium reaching midpoint of mesosternum. **Thorax** (pl. 18): As in generic description. *Hemelytron*: Relatively long, body form slender; cuneus, narrow, elongate triangular. GENITALIA (fig. 55, pl. 18): **Pygophore:** Elongate triangular. **Endosoma:** Sigmoid, twisted; dorsal strap extending well beyond secondary gonopore and bent to left as strong, attenuate, curved spine; ventral strap terminating just distad of gonopore as much shorter attenuate spine; secondary gonopore small, weakly sclerotized, within interstrap membrane. **Phallotheca:** Apical portion narrowly conical; aperture slit-like situated on dorsal anterior side continuing around apex. **Parameres:** Left paramere with deflected posterior process and slightly produced anterior process. Right paramere moderately large, lanceolate, with solitary moderately long apical spine.

Female: Unknown.

Etymology: Named for Anna Namyatova, collector of the only known specimen of this taxon.

Host: Unknown.

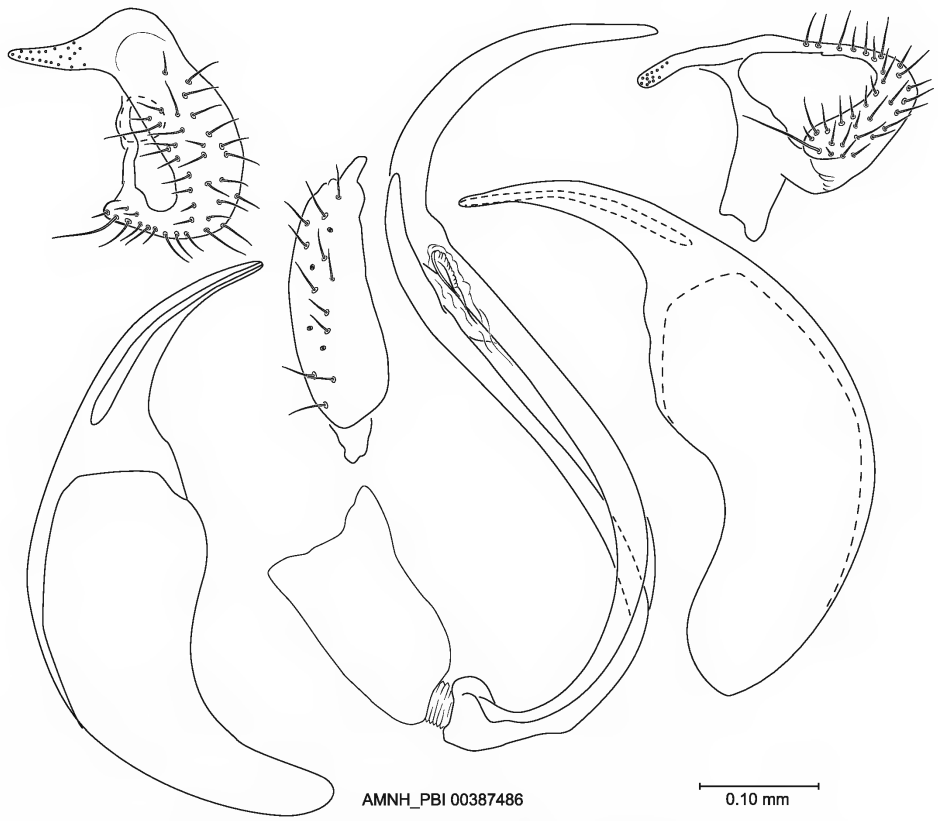


Fig. 55. Male genitalic structures of *Monospiniphallus namyatovae*.

Distribution (map 15): Known only from the Witchelina Nature Reserve, about 650 km north of Adelaide, South Australia.

Holotype: **AUSTRALIA: South Australia:** Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.095°S 138.13583°E, 116 m, 14 Oct 2010, A. Namyatova, host undetermined, Cassis Lab, UNSW – Bush Blitz, 1♂ (AMNH_PBI 00387486) (SAMA).

Monospiniphallus norsemanensis, new species
Figure 56, map 15, table 1, plate 18

Diagnosis: Recognized by the moderately elongate body form, infuscate pronotum, basal half of clavus, and appendages, strongly infuscate membrane (pl. 18), and C-shaped (coiled) endosoma (fig. 56, pl. 18). Distinguished from *M. bignoniiflori* by uniform green coloration and J-shaped, large eyes, untwisted endosoma with only a single spine surpassing the secondary gonopore in that species, and from *M. namyatovae* by the elongate, relatively slender body form, yellow coloration (in preserved specimens), orange cuneus, weakly infuscate basal half of clavus and appendages, and twisted weakly sigmoid endosoma in that species.

Description: *Male:* Total length 3.10, pronotum width 0.88. COLORATION (pl. 18): Underlying coloration dirty green; pronotum and basal half of clavus infuscate, entire membrane strongly infuscate. SURFACE AND VESTITURE (pl. 18): Dorsal vestiture of reclining, dark, simple setae. STRUCTURE: **Head** (pl. 18): Eyes of moderate size, vertex relatively broad; frons very weakly swollen and barely projecting beyond anterior margin of eye; eye occupying three-quarters height of head; antennae inserted just above ventral margin of eye; antennal segment 2 relatively short, stout, of uniform diameter (0.79), 1.27 times width of head; labium reaching to apex of

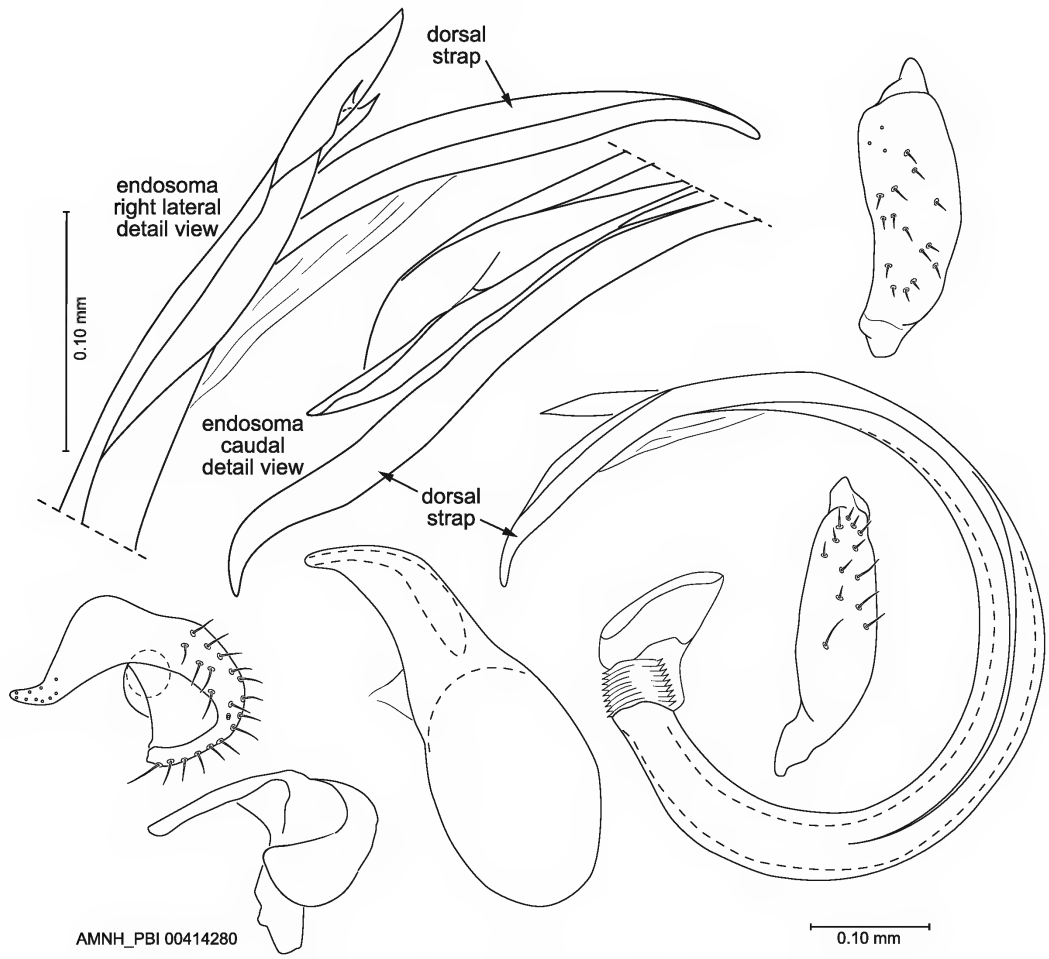


Fig. 56. Male genitalic structures of *Monospiniphallus norsemanensis*.

mesocoxa. **Thorax** (pl. 18): As in generic description. *Hemelytron*: Relatively long, body moderately elongate; cuneus weakly elongate triangular. GENITALIA (fig. 56, pl. 18): **Pygophore:** Bell shaped with wide truncate posterior margin. **Endosoma:** C-shaped (coiled); dorsal strap long terminating in slightly expanded bladelike apical spine; ventral strap shorter, bifid apically with pair of bladelike spines with lateralmost one shorter; secondary gonopore not visible. **Phallotheca:** Apical portion conical with broad base; apex projecting dorsad with elongate ovoid aperture situated on anterior surface. **Parameres:** Left paramere with short posterior process bent laterad; anterior process slightly produced. Right paramere moderately large with broadly flattened irregular apex.

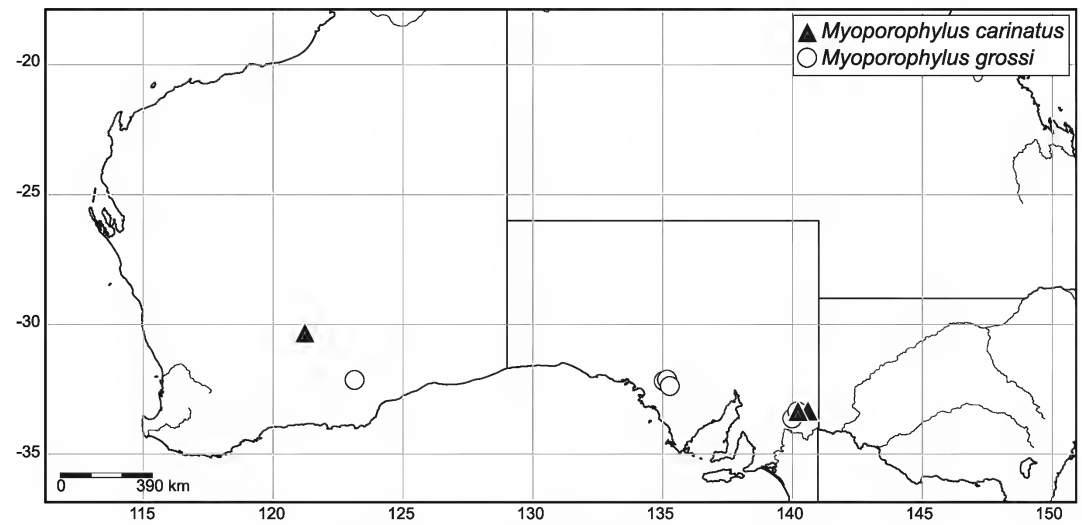
Female: Unknown.

Etymology: Named for the town of Norseman, Western Australia, near the type locality.

Host: The only known specimen was taken on *Olearia* sp. (Asteraceae).

Distribution (map 15): Known only from the type locality, Newman Rocks, east of Norseman, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Newman Rocks, 136.5 km E of Norseman, 32.11084°S 123.1704°E, 250 m, 22 Oct 1996, Schuh and Cassis, *Olearia* sp. (Asteraceae), det. PERTH staff PERTH 05095050, 1♂ (AMNH_PBI 00414280) (WAMP).



Map 16. Distribution of *Myoporophylus* spp.

Myoporophylus, new genus

TYPE SPECIES: *Myoporophylus grossi,* new species.

DIAGNOSIS: Recognized by the large, robust body form, the unicolorous yellow coloration, and dorsum covered with reclining dark simple setae (pl. 19); endosoma sigmoid, secondary gonopore near apex with two simple spines surpassing secondary gonopore by about length of it (figs. 58, 59, pl. 19). Sexual dimorphism moderate, with hemelytron in female somewhat shorter than in male. Endosomal structure similar to that of *Omnivoriphylus* spp., but species in that group with variable habitus and without robust unicolorous body form seen in *Myoporophylus* spp.

DESCRIPTION: *MALE*: Total length 3.17–4.30, pronotum width 1.08–1.42. COLORATION (pl. 19): Pale to yellow (in preserved specimens), including all appendages, without markings; membrane weakly fumose. SURFACE AND VESTITURE (fig. 57A, B, pl. 19): Body surface smooth, unpolished, dull; dorsal vestiture of reclining dark setae. STRUCTURE (fig. 57A, pl. 19): **Head:** Weakly to distinctly transverse, conforming to anterior margin of pronotum or eyes distinctly bulging; frons weakly projecting beyond eyes or not; antennal segment 2 variable. **Thorax:** Pronotum ranging from relatively short along midline to broad and shieldlike, lateral margins carinate or not. Pretarsus as in figure 57D. *Hemelytron*: Lateral margin ranging from straight to rather strongly convex. GENITALIA (figs. 57C, 58, 59, pl. 19): **Pygophore:** Broadly conical or triangular, truncate apically; left margin of aperture slightly raised with a few bristles anteriad of paramere insertion. **Endosoma:** Sigmoid; straps adhered to one another from base to just proximad of secondary gonopore; dorsal strap bifid both proximal to and distad of secondary gonopore with subapical and apical spines of variable structure, longer apical spine surpassing secondary gonopore by about length of gonopore and supporting billowy membranes; ventral strap strongly attenuate proximal to and terminating near left side of secondary gonopore; secondary gonopore subapical, situated within thin billowy interstrap membrane. **Phallotheca:** Apical portion broadly conical, dorsal margin with variable length crests, aperture reaching apex, situated on anterior dorsal surface, long with undulating margin; basal portion long, reaching to just beyond middle of pygophore ventral surface in situ. **Parameres:** Left paramere typically phyline somewhat elongate in dorsal view, dorsoposterior margin and posterior process variable; anterior process small, prominent seta on lateral surface of lobe. Right paramere relatively large without distinct apical projection.

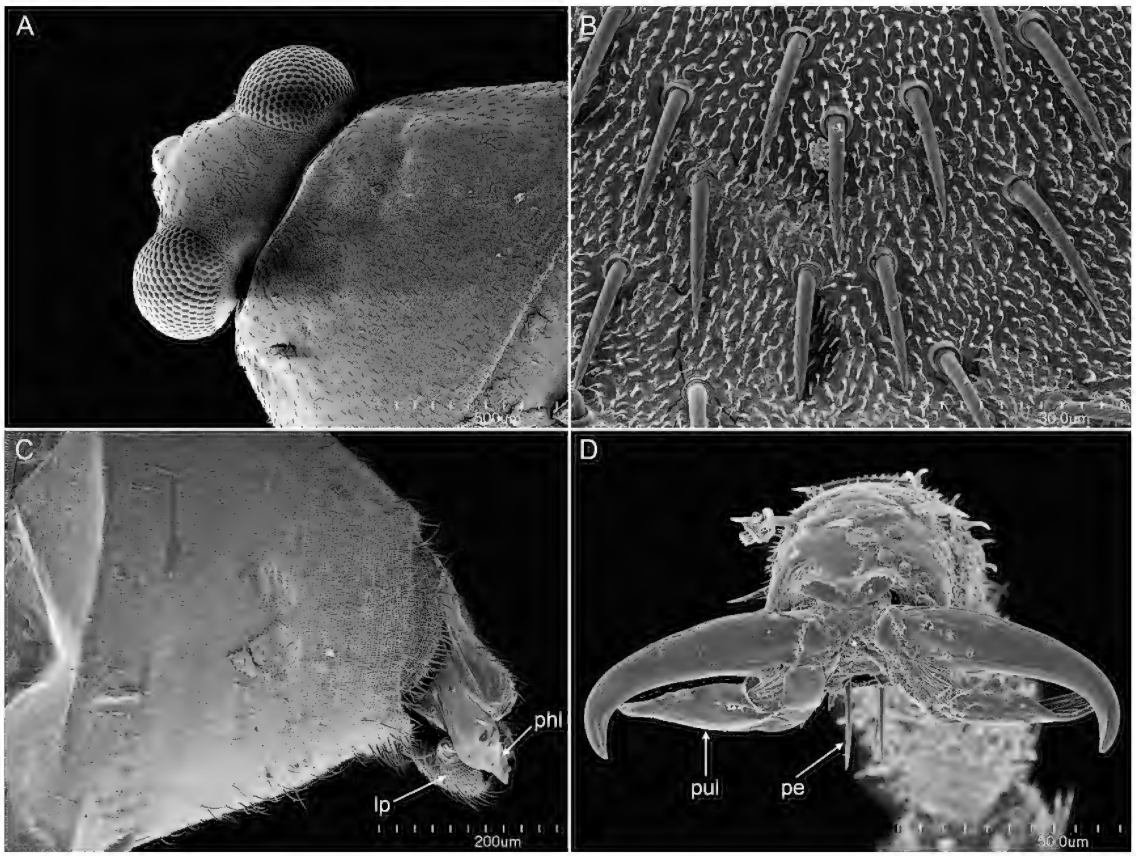


Fig. 57. *Myoporophylus grossi*. Scanning electron micrographs. **A.** Dorsofrontal view of head and pronotum. **B**. Detail of pronotal setae. **C.** Dorsal view of pygophore. **D.** Frontal view of pretarsus. Abbreviations: **lp,** left paramere; **pe**, parempodium; **phl,** phallotheca; **pul**, pulvillus.

Female (pl. 19): Similar to male in coloration and structure; sexual dimorphism weak; total length 3.09–4.43, pronotum width 1.14–1.56. GENITALIA (pl. 49): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Large, reaching beyond anterior margin of dorsal labiate plate. *First gonapophyses*: Large, quadrate basal blocks with irregularly undulate margins. *Ventral labiate plate*: Platelike medial anteroventral extension relatively long, covering anterior surface of basal structures, but not as wide as lateral margin. **Dorsal labiate plate:** Medium length. *Sclerotized rings*: Large, relatively flat, relatively thin walled, subovoid or subtriangular. *Posteromedial region*: Surface without conspicuous microstructure. *Anterolateral region*: Anterior margin extending beyond anterior edge of sclerotized rings by length of a ring. **Posterior wall:** *Intersegmental structure*: Conspicuous triangular transverse outpocket projecting posteriorly from dorsal surface of connecting membrane. *Interramal sclerites*: Apparently entirely membranous with conspicuous microspiculate dorsal surface.

Etymology: From the generic name *Myoporum*, in reference to its host association, and the generic name *Phylus*; masculine.

Discussion: Among members of the Australian Cremnorrhinina *Myoporophylus* spp. are among the largest and of the most robust body form.

Myoporophylus carinatus, new species
Figure 58, map 16, table 1, plate 19

Diagnosis: In addition to attributes provided in the generic diagnosis, recognized by the unique carinate lateral margin of the

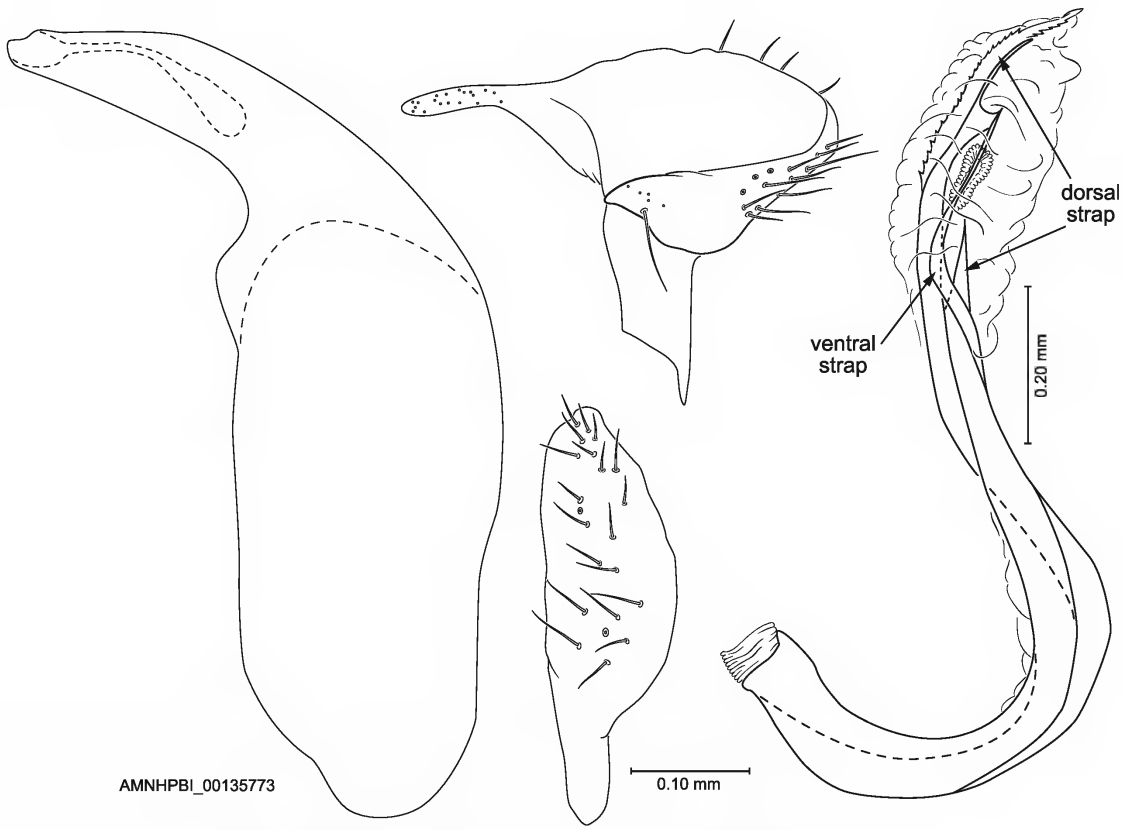


Fig. 58. Male genitalic structures of *Myoporophylus carinatus*.

pronotum and somewhat smaller size than in *M. grossi* (pl. 19); endosoma in *M. carinatus* large and nearly J-shaped (fig. 58, pl. 19), whereas in *M. grossi* endosoma smaller and more strongly sigmoid (fig. 59, pl. 19); antennal segment 2 in *M. carinatus* much shorter than in *M. grossi*.

DESCRIPTION: *MALE*: Mean total length 3.25, mean pronotum width 1.18. COLORATION (pl. 19): As in generic description. SURFACE AND VESTITURE (pl. 19): As in generic description. STRUCTURE (pl. 19): **Head:** Weakly transverse, conforming to anterior margin of pronotum, eyes not bulging; frons rounded and moderately projecting beyond eyes; eye occupying slightly less than two-thirds height of head; antenna inserted just above ventral margin of eye, eye not emarginate at insertion; antennal segment 2 short (0.44), stout, of uniform diameter, 0.57 times width of head; labium reaching midpoint of mesosternum. **Thorax:** Pronotum broad along midline and shieldlike, lateral margins carinate, weakly convex, posterior margin moderately excavated; mesoscutum moderately exposed. *Hemelytron*: Lateral margin rather strongly convex, overall body form broadly ovoid. GENITALIA (fig. 58, pl. 19): **Pygophore:** Triangular. **Endosoma:** Large, J-shaped and weakly sigmoid, apical portion from basal curve to apex of endosoma about twice as long as basal curved region; dorsal strap bifid proximad of secondary gonopore forming short narrow spine terminating proximad of gonopore and long thin, minutely serrate, apical spine subtended by short prominent triangular spine; ventral strap terminating as thin spine subapically at level of prominent spine of dorsal strap. **Phallotheca:** Dorsal margin with short crest basad. **Parameres:** Left paramere elongate in dorsal view, dorsoposterior margin produced posteriad, slightly elevated above posterior and anterior processes; posterior process with undulating

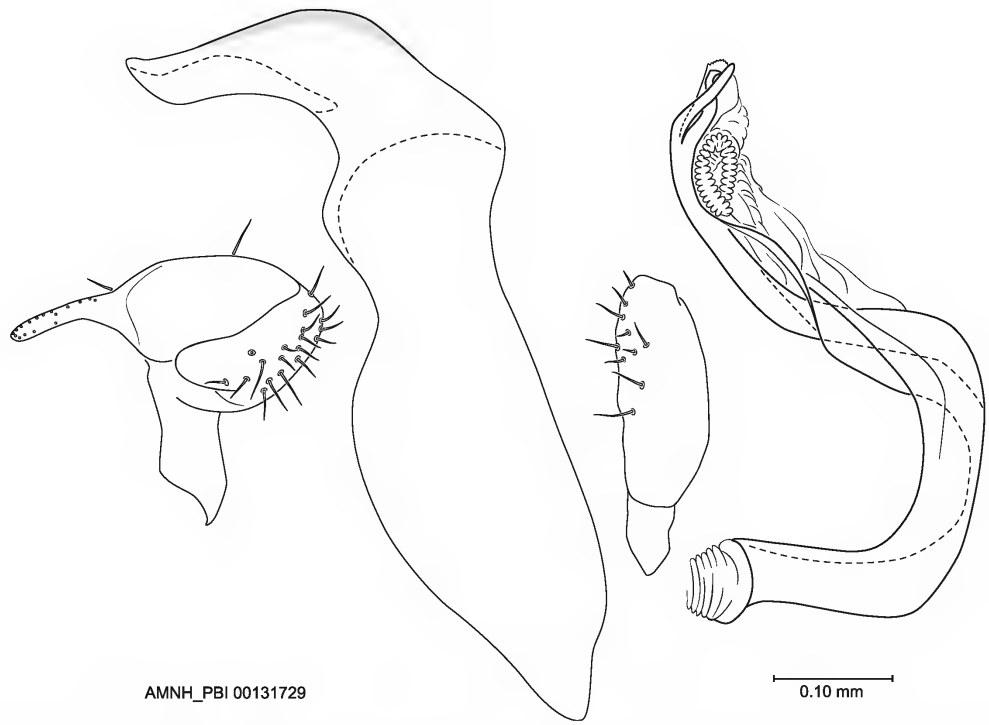


Fig. 59. Male genitalic structures of *Myoporophylus grossi*.

lateral margin, distally long and straight; anterior process small, broad basally, forming sharp apex on anteromedial surface; prominent seta on lateral surface of lobe. Right paramere elongate, somewhat fusiform with blunt medial point.

Female (pl. 19): Coloration as in male; differing from male as in generic description; mean total length 3.24, mean pronotum width 1.21.

Etymology: From the Latin, *carina*, "keel," in reference to the carinate lateral margin of the pronotum.

Host: Recorded from *Eremophila scoparia* (Scrophulariaceae).

Distribution (map 16): Known from southeastern South Australia and the Kalgoorlie region of Western Australia.

Holotype: **AUSTRALIA: Western Australia:** 53.9 km N of Kalgoorlie, 30.28882°S 121.2558°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila scoparia* (R.Br.) F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 05095123, 1♂ (AMNH_PBI 0013 5775) (WAMP).

Paratypes: **AUSTRALIA: South Australia:** Donggali Cons. Park, 30.1 km S of Oakbank, 33.28742°S 140.5881°E, 100 m, 08 Nov 1996, Schuh and Cassis, *Eremophila scoparia* (R.Br.) F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 05236533, 1♂ (00413076) (WAMP). **Western Australia:** 53.9 km N of Kalgoorlie, 30.28882°S 121.2558°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila scoparia* (R.Br.) F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 05095123, 7♂ (00388832–00388838), 6 nymphs (00388839–00388844), 5♀ (00388845–00388849) (AM), 4♂ (00135772, 00135776, 00135773, 00135777), 3♀ (00135778–00135780) (AMNH), 2♂ (00135771, 00135774), 1♀ (00135781) (WAMP).

Myoporophylus grossi, new species
Figures 57, 59, map 16, table 1, plate 19, 49

Diagnosis: In addition to attributes provided in the generic diagnosis, recognized by rounded (noncarinate) lateral margin of the pronotum, larger size, and more nearly parallel-sided body form than in *M. carinatus*

(pl. 19), as well as the smaller and more strongly sigmoid endosoma (fig. 59, pl. 19).

DESCRIPTION: *MALE:* Mean total length 4.19, mean pronotum width 1.39. COLORATION (pl. 19): As in generic description. SURFACE AND VESTITURE (fig. 57A, B, pl. 19): As in generic description. STRUCTURE: **Head** (fig. 57A, B, pl. 19): Distinctly transverse, eyes distinctly bulging; frons flat, not projecting beyond eyes; eye occupying slightly less than two-thirds height of head; antenna inserted just above ventral margin of eye, eye emarginate at insertion; antennal segment 2 relatively short (0.98), stout, of uniform diameter, 1.07 times width of head; labium just surpassing midpoint of mesosternum. **Thorax** (fig. 57A, pl. 19): Pronotum relatively short along midline, lateral margins rounded in cross section. Pretarsus as in figure 57D. *Hemelytron*: Lateral margin nearly straight, body form nearly parallel sided. GENITALIA (figs. 57C, SSSSS59, pl. 19): **Pygophore:** Conical. **Endosoma:** Relatively small, strongly sigmoid, portion from basal curve to apex of endosoma just longer than basal curved region; dorsal strap forming short, moderately wide subapical sclerite terminating at base of secondary gonopore and spine bifid distad of gonopore forming a minutely serrate, capitate apical spine and an adjoining slender, curved, sharp spine; ventral strap strongly attenuate proximal to secondary gonopore, terminating subapically at base of curved spine of dorsal strap as thin curved spine forming dorsal margin of secondary gonopore; secondary gonopore at base of apical spines. **Phallotheca:** Dorsal margin with long crest. **Parameres:** Left paramere typically phyline in dorsal view, dorsoposterior margin straight and at level of posterior and anterior processes; posterior process with slightly undulating lateral margin, apically elongate; anterior process rounded apically. Right paramere relatively short and parallel sided, with blunt apex and a more prominent posterior angle.

FEMALE (pl. 19): Coloration as in male; differing from male as in generic description; mean total length 4.30, mean pronotum width 1.52. GENITALIA as in plate 49.

ETYMOLOGY: Named in honor of the late Gordon F. Gross, in recognition of this contributions to fieldwork that produce long series of this species as well as his extensive contributions to our knowledge of Australian Pentatomoidea and Heteroptera more broadly.

HOST: Recorded from *Myoporum platycarpum* (pl. 39F) (Scrophulariaceae).

DISTRIBUTION (map 16): Known from the interior of South Australia north of Adelaide.

HOLOTYPE: **AUSTRALIA: South Australia:** 51 km NW of Morgan, 33.58334°S 140°E, 150 m, 01 Nov 1995, Schuh, Cassis, and Gross, at light, 1♂ (AMNH_PBI 00389492) (SAMA).

PARATYPES: **AUSTRALIA: South Australia:** 51 km NW of Morgan, 33.58334°S 140°E, 150 m, 01 Nov 1995, Schuh, Cassis, and Gross, at light, 52♂ (00087283, 00389465, 00389466, 00389468–00389485, 00389487–00389491, 00389494, 00389507–00389529, 00389943, 00389944), 35♀ (00087284, 00389530–00389544, 00389546–00389549, 00389552–00389565, 00389571) (AM), 40♂ (00131707–00131728, 00412260, 00132825–00132838, 00389467, 00389486, 00389493), 23♀ (00131731–00131738, 00131741, 00132839–00132848, 00389545, 00389550, 00389551, 00389570) 2♂ (00131729, 00131730), 2♀ (00131739, 00131740) (AMNH), 3♂ (00389501–00389503) (ANIC), 3♂ (00389498–00389500) (CNC), 14♂ (00131825–00131834, 00372026, 00389940–00389942), 12♀ (00131835–00131838, 00389566–00389569, 00372027–00372030) (SAMA), 3♂ (00389504–00389506) (USNM), 3♂ (00389495–00389497) (ZISP). 96 km NW of Morgan, Pine Valley Stn, 33.31667°S 140.2°E, 150 m, 02 Nov 1995, Schuh, Cassis, and Gross, *Myoporum platycarpum* R. Br. (Scrophulariaceae), det. J. Everett 1996 NSW 395977, 3♂ (00388851, 00087413, 00087576), 12♀ (00388852–00388860, 00087414, 00132606, 00132607) (AMNH), 1♂ (00132599), 6♀ (00132600–00132605) (SAMA). Gawler Ranges National Park: ca. 3.7 km S of Pine Well, 32.37141°S 135.29219°E, 186 m, 16 Nov 2012, M. Cheng, G.S. Taylor, R. Kittel, & D. McLaughlin, *Myoporum platycarpum* R. Br. *platycarpum* (Scrophulariaceae), det. SA Herbarium BS838-902, 9♂ (00413933–00413941), 10♀ (00413945–00413954) (UNSW). Hiltaba: 2 km S of Trump Dam, 32.10241°S 135.2063°E, 216 m, 14 Nov 2012, M. Cheng & G.S. Taylor, *Myoporum platycarpum* R. Br. *platycarpum* (Scrophulariaceae), det. SA Herbarium BS838-915, 1♂ (00413929) (UNSW). Hiltaba: ca. 1 km N of the southern boundary, on Gawler Ranges Road,

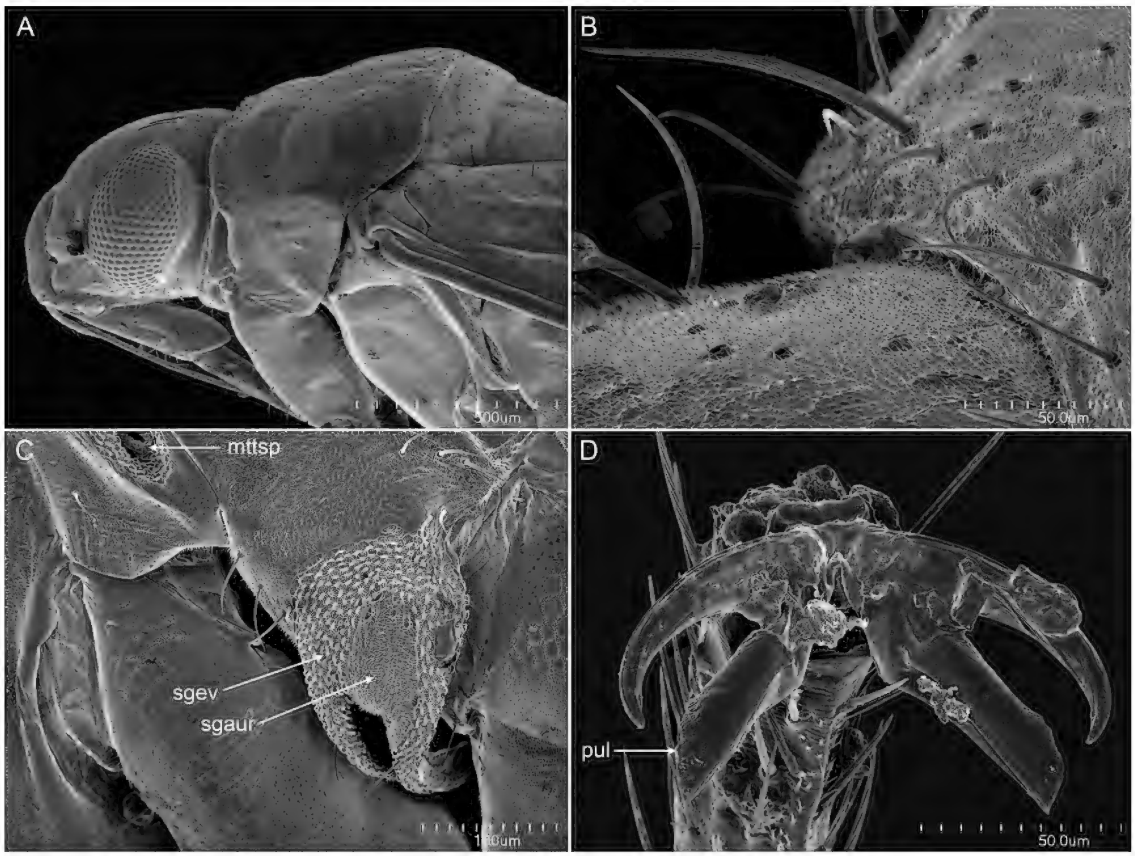


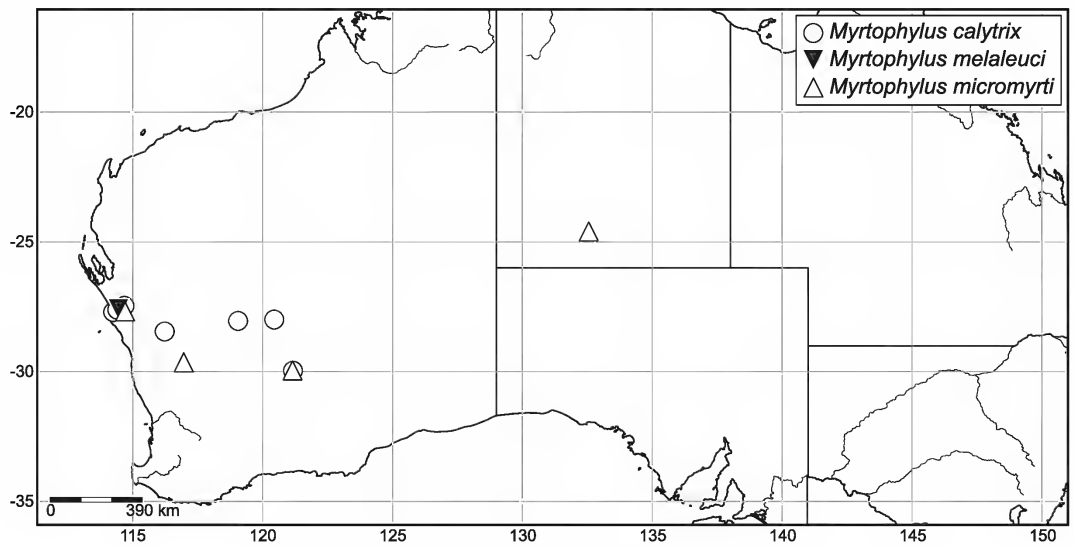
Fig. 60. *Myrtophylus calytrix*. Scanning electron micrographs. **A.** Lateral view of head and pronotum. **B**. Detail of head and pronotal setae. **C.** Prothorac showing lower margin of metathoracic spiracle, metathoracic scent-gland auricle, and evaporatory area. **D.** Frontal view of pretarsus. Abbreviations: **mttsp**, metathoracic spiracle; **pul**, pulvillus; **sgaur,** scent gland auricle; **sgev,** scent gland evaporatory area.

32.17327°S 135.05894°E, 126 m, 12 Nov 2012, M. Cheng & G.S. Taylor, *Myoporum platycarpum* R. Br. *platycarpum* (Scrophulariaceae), det. SA Herbarium BS838-902, 3♂ (00413930–00413932), 3♀ (00413942–00413944) (UNSW). **Western Australia:** Newman Rocks, 136.5 km E of Norseman, 32.11084°S 123.1704°E, 250 m, 22 Oct 1996, Schuh and Cassis, 1♂ (00388850) (AM).

Myrtophylus, new genus

Type Species: *Myrtophylus calytrix,* new species.

Diagnosis: Recognized by the elongate, parallel-sided body form, nearly unicolorous yellow-to-orange body and appendages, and moderately exserted head with distinctly protruding eyes (pl. 20); dorsal strap of endosoma bifid distad of secondary gonopore, ventral strap forming a broad lateral spine at level of secondary gonopore (figs. 61–63, pl. 21); phallotheca with a heavily sclerotized dorsal crest; right paramere broadly rounded, with a short apical projection (figs. 61–63). Similar to *Dicyphylus* and *Spinivesica* in possession of a lateral endosomal spine at level of secondary gonopore; distinguished from both of those genera by its elongate parallel-sided body in combination with the nearly unicolorous body and appendages; also differing from *Dicyphylus* in its simple, bifid endosomal apex rather than having the more complex structural forms found in that group, and from *Spinivesica* by lacking the membranous apical endosomal bag covered with denticles found in all species of that group.



Map 17. Distribution of *Myrtophylus* spp.

DESCRIPTION: *MALE*: Total length 3.13–4.59, pronotum width 0.87–1.03. COLORATION (pl. 20): Preserved specimens ranging from entirely yellow green to orange, including all appendages, sometimes with broad infuscate areas on corium and clavus; membrane weakly to moderately fumose, veins pale or fumose as membrane. SURFACE AND VESTITURE (fig. 60A, B, pl. 20): Dorsum smooth, polished, and shining; dorsal vestiture of short, pale, recumbent simple setae. STRUCTURE (pl. 20): General body form elongate, parallel sided, at most weakly flattened. **Head** (fig. 60A, pl. 20): Narrow with narrow, somewhat swollen vertex and frons and protuberant somewhat globular eyes; frons and clypeus projecting beyond anterior margin of eye in dorsal view; antennal segment 2 very long and slender, nearly parallel sided over entire length. **Thorax** (fig. 60A, pl. 20): Trapezoidal, lateral margins nearly straight, posterior lobe somewhat elevated, posterior margin straight; calli at most weakly elevated, polished, and without setae; mesoscutum narrowly to rather broadly exposed. Metathoracic pleuron as in figure 60C. Pretarsus as in figure 60D. *Hemelytron*: Elongate, corial margin straight, or nearly so, cuneus moderately elongate. GENITALIA (figs. 61–63, pl. 21): **Pygophore:** Broadly triangular, somewhat truncate posteriorly; diffuse group of long, erect setae located just ventrad of aperture and anteriad of left paramere insertion; dorsal and ventral surfaces without tubercles, clumps of bristles, or field of stout bristles. **Endosoma:** Sigmoid, distal one-half bent to left to a variable degree; straps adhered to one another from base of endosoma to level of secondary gonopore, with apical and subapical spines supporting variable billowy membrane; ventral strap bifid at level of secondary gonopore, one spine extending distad of secondary gonopore and one spine variably directed laterally; dorsal strap variable, usually with broad plate at level of secondary gonopore, and long spine either reflected or subparallel to long apical spine of ventral strap; rarely dorsal strap bifid distad of secondary gonopore; secondary gonopore weakly sclerotized and open slightly. **Phallotheca:** Apical portion narrowed toward apex, dorsal surface with variable, well sclerotized crest; aperture large, elongate ovoid, situated on anterior dorsal surface, reaching around apex; basal portion relatively long, reaching to middle of pygophore ventral surface in situ. **Parameres:** Left paramere typically phyline with flat or slightly undulating dorsoposterior margin; posterior process undulating in dorsal view, elongate, slightly deflected ventrad; anterior process short, narrow apically. Right paramere more

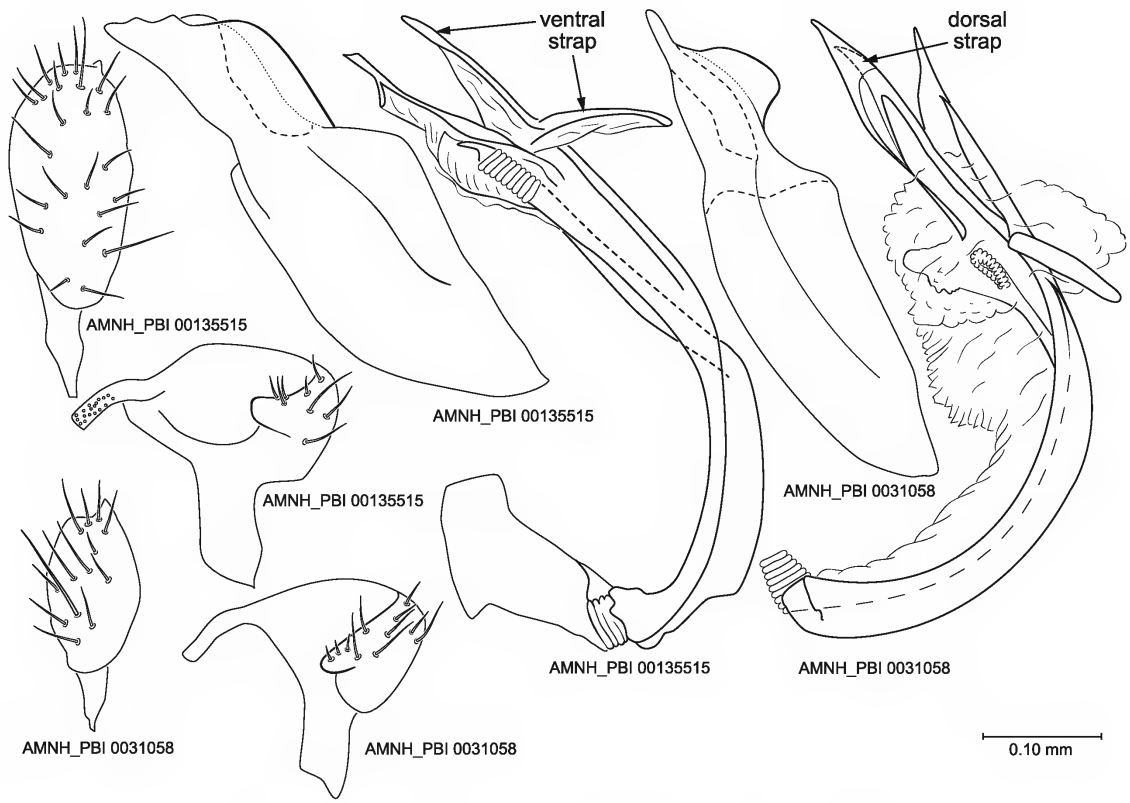


Fig. 61. Male genitalic structures of *Myrtophylus calytrix*.

or less parallel sided, with a short, medial, apical process and a protuberance on anterior angle.

Female (pl. 20): Coloration similar to male; body more strongly ovoid than in male, corial margins convex; eyes smaller, not so strongly bulging, vertex relatively wider; total length 2.99–4.49, pronotum width 0.94–1.15. GENITALIA (pl. 50): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Relatively small, not attaining posterior margins of sclerotized rings. *First gonapophyses*: Relatively small, elongate basal blocks extending posteriad of gonapophysal base. *Ventral labiate plate*: Platelike medial anteroventral extension short, weakly covering anterior surface of basal structures. **Dorsal labiate plate:** Shield shaped, very long. *Sclerotized rings*: Moderately large, smoothly subtriangular, slightly concave, thick walled. *Posteromedial region*: Surface without conspicuous microstructure. *Anterolateral region*: Rings removed from anterior and posterior margins of dorsal labiate plate; anterior margin extending beyond anterior edge of sclerotized rings by twice length of a ring. **Posterior wall:** *Intersegmental structure*: Conspicuous, bulbous, microspiculate, bilobed, transverse outpocket projecting into genital chamber from ventral surface of connecting membrane. *Interramal sclerites*: Weakly sclerotized with relatively wide, elongate, lateral sclerites and inconspicuous medial sclerite.

Etymology: From the generic name *Myrtus*, in reference to it occurrence on the Myrtaceae, and the generic name *Phylus*; masculine.

Myrtophylus calytrix, new species
Figures 60, 61, map 17, table 1, plates 20, 21, 50

Diagnosis: Recognized by relatively large body size and endosoma with two subequal-

length apical spines, a straight subapical, ventrally directed lateral spine, and faint plate near secondary gonopore (fig. 61, pl. 21). Distinguished from its congeners by the larger size and apical endosomal spines of subequal length.

DESCRIPTION: *MALE*: Elongate, slender; mean total length 4.26, mean pronotum width 1.00. COLORATION (pl. 20): Bright yellow, including all appendages (in preserved specimens); membrane weakly fumose, veins pale with a diffuse dark spot at apex of cells. SURFACE AND VESTITURE (fig. 60A, B, pl. 20): As in generic description. STRUCTURE (pl. 20): Elongate, nearly parallel sided. **Head** (fig. 60A, pl. 20): As in generic description; frons and clypeus projecting beyond anterior margin of eye in dorsal view; eye occupying slightly less than one-half height of head in lateral view; antenna inserted above ventral margin of eye by about diameter of antennal fossa, eye rather strongly emarginate at insertion; antennal segment 2 relatively long (1.43), 1.90 times width of head; labium length variable, reaching from apex of mesocoxa to well onto abdomen. **Thorax** (pl. 20): Pronotum as in generic description; mesoscutum broadly exposed. Metathoracic pleuron as in figure 60C. Pretarsus as in figure 60D. *Hemelytron*: As in generic description. GENITALIA (fig. 61, pl. 21): As in generic description but with the following details. **Endosoma:** Ventral strap with pair of equal-length, narrow spines, one distad and one laterad of secondary gonopore; dorsal strap distad of secondary gonopore long, subapically bifid, terminating in two sharp spines, with faint, broad plate adjacent to secondary gonopore. **Phallotheca:** Crest moderately large.

FEMALE (pl. 20): Coloration as in male; differing from male as in generic description; mean total length 4.01, mean pronotum width 1.11. GENITALIA as in plate 50.

ETYMOLOGY: Named after the myrtaceous genus *Calytrix*, host of many of the known specimens; a noun in apposition.

HOSTS: Recorded from *Calytrix angulata* (pl. 34B), and *C. brevifolia* (Myrtaceae); also recorded *Aluta aspera* (pl. 34A), *Baeckea* sp., *Darwinia diosmoides* (pl. 34D), *Leptospermum fastigiatum,* and *Thryptomene urceolaris* (pl. 34F) (Myrtaceae). The record from *Ricinocarpos velutinus* (Euphorbiaceae) is almost certainly not a breeding host.

DISTRIBUTION (map 17): Known from the Goldfields-Kalbarri regions of Western Australia.

DISCUSSION: Specimens we place in this taxon show some variation in male genitalic structure, notably the fine details of the apical endosomal spines, as well as variation in the length of the labium. We, however, have been unable to recognize a pattern in this variation and therefore treat all specimens as belonging to a single species.

HOLOTYPE: **AUSTRALIA: Western Australia:** 28 km S of Menzies (3.5 km E of Hiway), 29.91917°S 121.1514°E, 500 m, 25 Oct 1996, Schuh and Cassis, *Calytrix angulata* Lindl. (Myrtaceae), det. PERTH staff PERTH 05099706, 1♂ (AMNH_PBI 00135513) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 24 km W of Sandstone, 28.01426°S 119.0474°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Aluta aspera* (E. Pritz.) Rye & Trudgen (Myrtaceae), det. PERTH staff PERTH 05095182, 11♀ (00389250–00389253, 00389255–00389259, 00389264, 00389265), 1♂ (00087198) (AM), 3♀ (00389254, 00389263, 00087199), 1♂ (00129871) *Thryptomene aspera glabra* E. Pritz. (Myrtaceae), det. PERTH staff PERTH 05095182, 5♀ (00129872–00129876) (AMNH), *Aluta aspera* (E. Pritz.) Rye & Trudgen (Myrtaceae), det. PERTH staff PERTH 05095182, 3♀ (00389260–00389262) (WAMP). 28 km S of Menzies (3.5 km E of Hiway), 29.91917°S 121.1514°E, 500 m, 25 Oct 1996, Schuh and Cassis, *Aluta aspera* (E. Pritz.) Rye & Trudgen (Myrtaceae), det. PERTH staff PERTH 05095093, 1♂ (00389234), 1♀ (00389235) *Calytrix angulata* Lindl. (Myrtaceae), det. PERTH staff PERTH 05099706, 4♂ (00389226–00389229), 4♀ (00389230–00389233) *Leptospermum fastigiatum* S. Moore (Myrtaceae), det. PERTH staff PERTH 05056527, 1♀ (00389237) (AM), *Calytrix angulata* Lindl. (Myrtaceae), det. PERTH staff PERTH 05099706, 8♂ (00135417, 00135511, 00135512, 00135514–00135517, 00135418), 25♀ (00135419–00135430, 00135432, 00135519–00135527, 00135529, 00135531, 00135532) *Thryptomene urceolaris* F. Muell. (Myrtaceae), det. PERTH staff PERTH 05095107, 3♂ (00099402, 00391058, 00129865), 1♀ (00129867) (AMNH),

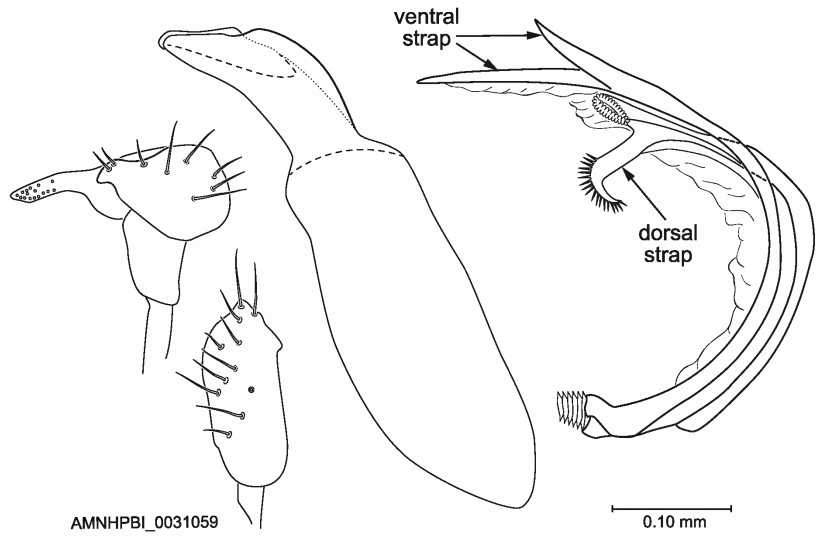


Fig. 62. Male genitalic structures of *Myrtophylus melaleuci.*

Calytrix angulata Lindl. (Myrtaceae), det. PERTH staff PERTH 05099706, 1♀ (00135434) (ANIC), 1♀ (00135433) (CNC), *Calytrix angulata* Lindl. (Myrtaceae), det. PERTH staff PERTH 05099706, 1♀ (00135435) (USNM), 6♀ (00135436–00135439, 00135528, 00135530) *Thryptomene urceolaris* F. Muell. (Myrtaceae), det. PERTH staff PERTH 05095107, 1♀ (00390852) (WAMP), *Calytrix angulata* Lindl. (Myrtaceae), det. PERTH staff PERTH 05099706, 1♀ (00135431) (ZISP). 31.7 km W of Agnew toward Sandstone, 27.96227°S 120.4277°E, 800 m, 26 Oct 1996, Schuh and Cassis, *Aluta aspera* (E. Pritz.) Rye & Trudgen (Myrtaceae), det. PERTH staff PERTH 05095190, 4♂ (00389238–00389241), 4♀ (00389246–00389249) (AM). 46.5 km W of Yalgoo, 28.41302°S 116.2151°E, 600 m, 27 Oct 1996, Schuh and Cassis, *Ricinocarpos velutinus* F. Muell. (Euphorbiaceae), det. PERTH staff PERTH 05120713, 1♀ (00099403) (AMNH). NW Coastal Hiway 57 km N of Kalbarri Road, 27.44756°S 114.6867°E, 500 m, 30 Oct 1996, Schuh and Cassis, *Baeckea* sp. (Myrtaceae), det. PERTH staff PERTH 05120322, 1♂ (00414412) (AM). ca. 1 km S of Murchison House HS, Kalbarri National Park, 27.65822°S 114.2394°E, 60 m, 23 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Calytrix brevifolia* (Meisn.) Benth. (Myrtaceae), det. PERTH staff PERTH6988709, 8♂ (00389287–00389293, 00389295), 9♀ (00389323, 00389325–00389327, 00389333–00389335, 00389337, 00389338) (AM), 3♂ (00389294, 00389296, 00414244), 7♀ (00389324, 00389332, 00389336, 00414245–00414248) (AMNH), 3♂ (00389297–00389299), 4♀ (00389328–00389331) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 28 km S of Menzies (3.5 km E of Hiway), 29.91917°S 121.1514°E, 500 m, 25 Oct 1996, Schuh and Cassis, *Aluta aspera* (E. Pritz.) Rye & Trudgen (Myrtaceae), det. PERTH staff PERTH 05095093, 1 nymph (00389236) (AM). 31.7 km W of Agnew toward Sandstone, 27.96227°S 120.4277°E, 800 m, 26 Oct 1996, Schuh and Cassis, *Aluta aspera* (E. Pritz.) Rye & Trudgen (Myrtaceae), det. PERTH staff PERTH 05095190, 4 nymphs (00389242–00389245) (AM). ca. 1 km S of Murchison House HS, Kalbarri National Park, 27.65822°S 114.2394°E, 60 m, 23 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Calytrix brevifolia* (Meisn.) Benth. (Myrtaceae), det. PERTH staff PERTH6988709, 23 nymphs (00389300–00389322) (AM).

Myrtophylus melaleuci, new species
Figure 62, map 17, table 1, plates 20, 21

Diagnosis: Recognized by relatively small body size and by unequal length, diverging apical endosomal spines and dorsally directed, subapically placed, recurved lateral spine bearing blunt spicules (fig. 62, pl. 21). Most

similar in endosomal structure to *M. calytrix*, but body smaller and apical endosomal spines of conspicuously unequal length and lateral spine recurved and with blunt-tipped spicules rather than straight and smooth.

DESCRIPTION: *MALE*: Moderately elongate; mean total length 3.77, mean pronotum width 0.90. COLORATION (pl. 20): Green, including all appendages (in preserved specimens); membrane weakly fumose, veins pale with a diffuse dark spot at apex of cells. SURFACE AND VESTITURE (pl. 20): As in generic description. STRUCTURE (pl. 20): Moderately elongate, nearly parallel sided. **Head:** As in generic description; frons and clypeus projecting beyond anterior margin of eye in dorsal view; eyes occupying two-thirds of height of head in lateral view; antenna inserted just above ventral margin of eye, eye weakly emarginate above fossa; antennal segment 2 relatively long (1.15), 1.71 times width of head; labium reaching to about middle of abdomen. **Thorax:** Pronotum as in generic description; mesoscutum broadly exposed. *Hemelytron*: As in generic description. GENITALIA (fig. 62, pl. 21): As in generic description but with the following details. **Endosoma:** Ventral strap forming unequal length, narrow, diverging apical spines; dorsal strap bifid at level of secondary gonopore, forming a weakly sclerotized surface laterad of secondary gonopore and a recurved lateral spine covered apically with blunt-tipped spicules. **Phallotheca:** Crest relatively short.

FEMALE (pl. 20): Coloration as in male; differing from male as in generic description; mean total length 3.07, mean pronotum width 0.95.

ETYMOLOGY: Named after the myrtaceous genus *Melaleuca*, host of some of the known specimens of this taxon.

HOSTS: Recorded from *Darwinia diosmoides* (pl. 34D) and *Melaleuca megacephala* (Myrtaceae).

DISTRIBUTION (map 17): Known only from the Kalbarri National Park, north of Geraldton, Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** Kalbarri National Park, Loop Road, 27.56163°S 114.4376°E, 300 m, 28 Oct 1996, Schuh and Cassis, *Melaleuca megacephala* F. Muell. (Myrtaceae), det. PERTH staff PERTH 05120616, 1♂ (AMNH_PBI 00099382) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** Kalbarri National Park, Loop Road, 27.56163°S 114.4376°E, 300 m, 28 Oct 1996, Schuh and Cassis, *Darwinia diosmoides* (DC.) Benth. (Myrtaceae), det. PERTH staff PERTH 05120551, 9♂ (00389266, 00389267, 00389270–00389276), 2♀ (00389281, 00389282) (AM), 3♀ (00389280, 00389283, 00389284) *Melaleuca megacephala* F. Muell. (Myrtaceae), det. PERTH staff PERTH 05120616, 2♂ (00391059, 0039 1060) (AMNH), *Darwinia diosmoides* (DC.) Benth. (Myrtaceae), det. PERTH staff PERTH 05120551, 2♂ (00389268, 00389269), 2♀ (0038 9285, 00389286) (WAMP). Kalbarri National Park, Z-Bend Road, 27.61971°S 114.3864°E, 500 m, 28 Oct 1996, Schuh and Cassis, 4♀ (00393467–00393470) (AM).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** Kalbarri National Park, Loop Road, 27.56163°S 114.4376°E, 300 m, 28 Oct 1996, Schuh and Cassis, *Darwinia diosmoides* (DC.) Benth. (Myrtaceae), det. PERTH staff PERTH 05120551, 3 nymphs (00389277-00389279) (AM).

Myrtophylus micromyrti, new species

Figure 63, map 17, table 1, plates 20, 21

DIAGNOSIS: Recognized by relatively small body size, apical endosomal spines curved and of unequal length, and ventrally directed, conspicuously bifid lateral endosomal spine (fig. 63, pl. 21). Endosomal structure unique among *Myrtophylus* spp. with curved apical spines and bifid lateral spine; relatively small, most similar in size to *M. melaleuci*.

DESCRIPTION: *MALE*: Mean total length 3.64, mean pronotum width 0.91. COLORATION (pl. 20): Bright yellow, including all appendages (in preserved specimens); membrane weakly fumose, veins pale with a diffuse dark spot at apex of cells. SURFACE AND VESTITURE: As in generic description. STRUCTURE (pl. 20): Weakly elongate, nearly parallel sided. **Head:** As in generic description; frons and clypeus projecting beyond anterior margin of eye in dorsal view; eyes occupying two-thirds of height of head in lateral view; antenna inserted just above ventral margin of eye, eye weakly emarginate above fossa; antennal segment 2 relatively long (1.05), 1.62 times width of

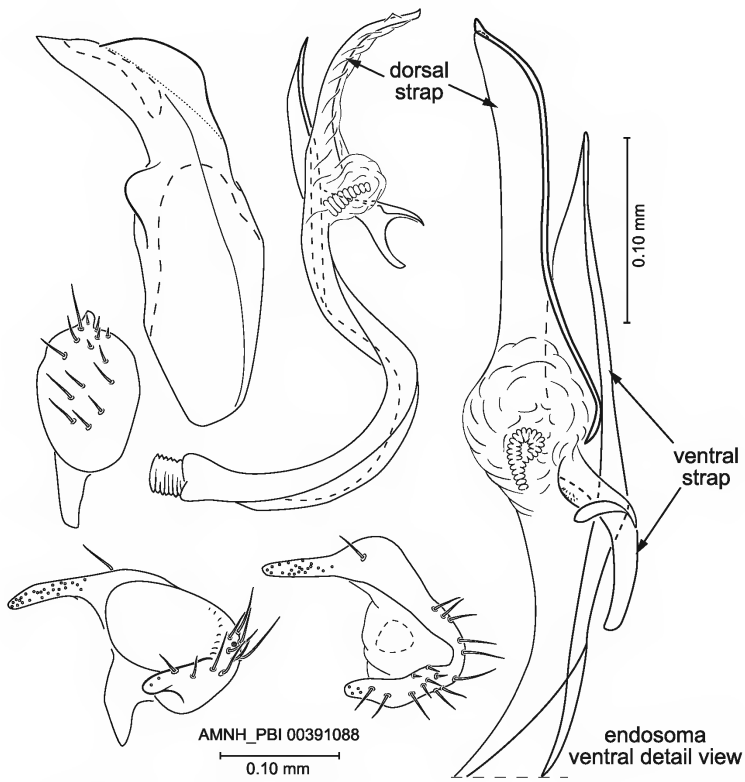


Fig. 63. Male genitalic structures of *Myrtophylus micromyrti*.

head; labium reaching to about middle of abdomen. **Thorax:** Pronotum as in generic description; mesoscutum broadly exposed. *Hemelytron*: As in generic description. GENITALIA (fig. 63, pl. 21): As in generic description but with the following details. **Endosoma:** Ventral strap bifid at level of secondary gonopore with one long, narrow apical spine and lateral spine perpendicular to endosoma body, apically bifid with U-shaped spines; dorsal strap divided at level equal to secondary gonopore with long curved, narrow pointed apical spine and weakly sclerotized surface laterad of secondary gonopore. **Phallotheca:** Crest moderately large.

Female (pl. 20): Coloration as in male; differing from male as in generic description; mean total length 3.55, mean pronotum width 1.05.

Etymology: Named after the myrtaceous genus *Micromyrtus*, host of some known specimens.

Hosts: Recorded from *Micromyrtus acuta*, *M. flaviflora*, and *Thryptomene urceolaris* (Myrtaceae).

Distribution (map 17): Known from the Alice Springs area of Central Australia and the Goldfields-Kalbarri areas of Western Australia.

Holotype: **AUSTRALIA: Western Australia:** NW Coastal Hiway 36 km N of Kalbarri Road, 27.62473°S 114.6902°E, 500 m, 29 Oct 1996, Schuh and Cassis, 1♂ (AMNH_PBI 00414243) (WAMP).

Paratypes: **AUSTRALIA: Northern Territory:** ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Micromyrtus flaviflora* (F. Muell.) F. Muell. ex J.M. Black (Myrtaceae), det. NSW staff NSW666258, 2♀ (00098611, 00098612) (AM), 2♀ (00098609, 00097167), 1♂ (00391088) (AMNH), 1♀ (00098610) (WAMP). **Western Australia:** 28 km S of Menzies (3.5 km E of Hiway), 29.91917°S 121.1514°E, 500 m, 25 Oct 1996, Schuh and Cassis, *Thryptomene urceolaris* F. Muell. (Myrtaceae), det. PERTH staff PERTH 05095107, 1♂ (00129866) (AMNH). Charles Darwin Reserve, granite SW of homestead on track to White Dam, 29.59338°S

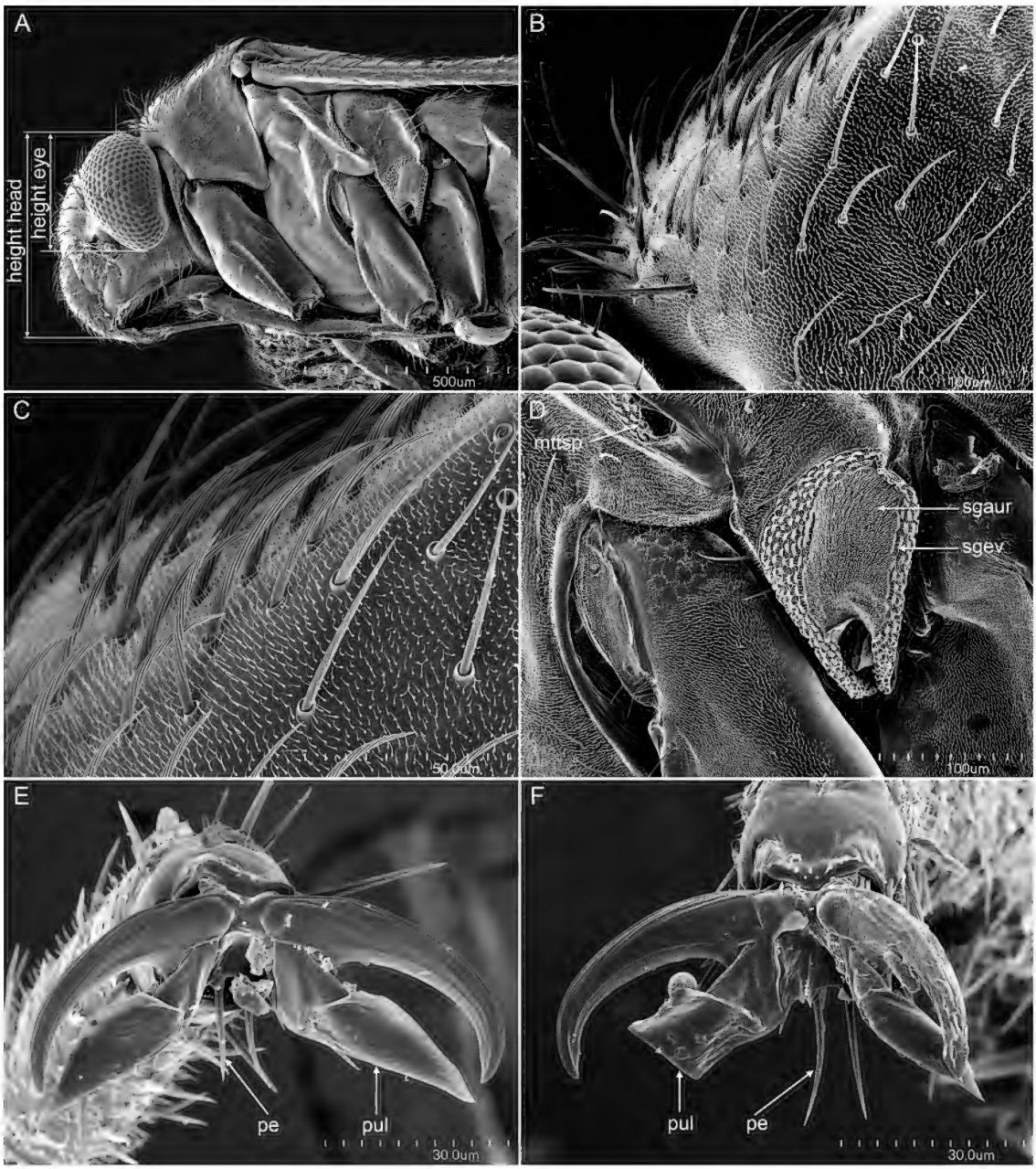
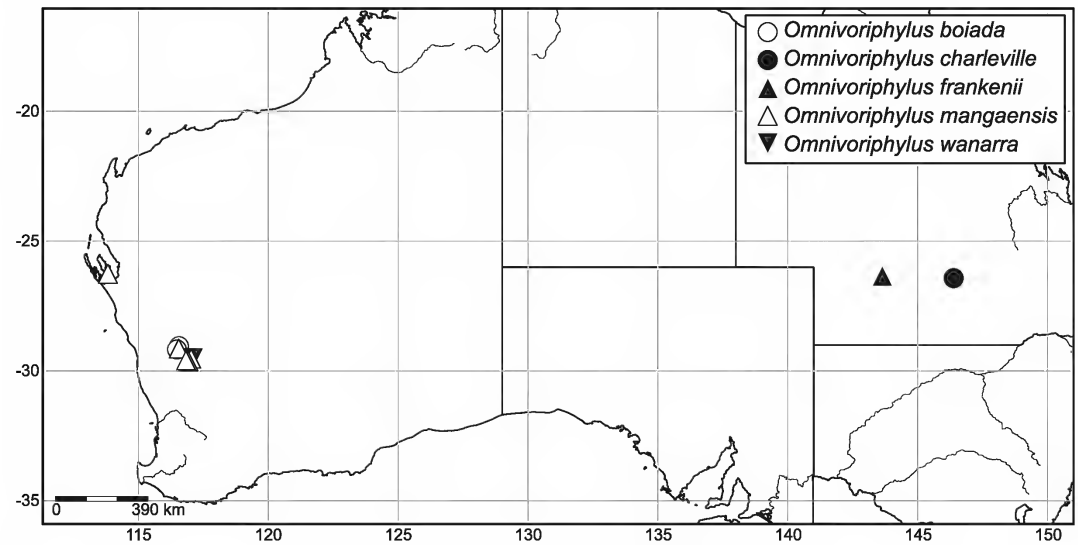


Fig. 64. *Omnivoriphylus mangaensis*. Scanning electron micrographs. **A.** Lateral view of head, showing structural details common to most Australian Cremnorrhinina. **B**. Detail of pronotal setae. **C.** Enlarged view of pronotal setae. **D.** Thoracic pleuron, showing metathoracic spiracle opening, metathoracic scent-gland auricle, and evaporatory area. **E.** Frontal view of pretarsus. **F.** Frontal view of pretarsus. Abbreviations: **mttsp**, metathoracic spiracle; **pe**, parempodium; **pul**, pulvillus; **sgaur,** scent gland auricle; **sgev,** scent gland evaporatory area.



Map 18. Distribution of *Omnivoriphylus* spp.

116.94697°E, 309 m, 24 Sep 2009, C. Symonds, *Micromyrtus acuta* Rye (Myrtaceae), det. WA Herbarium, 1♂ (00387491) (UNSW).

Omnivoriphylus, new genus

Type Species: *Omnivoriphylus mangaensis,* new species.

Diagnosis: This group of diverse habitus is held together by the structure of the sigmoid endosoma, with one or two slender apical spines of length about equal to length of secondary gonopore (figs. 65–69, pl. 23). Similar in endosomal structure to *Myoporophylus*, but that taxon of uniform yellow coloration (in preserved specimens) and robust body form in contrast to the smaller and usually more slender-bodied *Omnivoriphylus* spp. most of which have black spots on the corium at the inner angle of the cuneus and at the apex of the membrane cells.

Description: *Male*: Ranging from long and parallel sided to shorter and ovoid; total length 3.98–4.70, pronotum width 0.84–1.20. COLORATION (pl. 22): Variable, ranging from pale and translucent with dark spots at apex of corium and on membrane to more rarely opaque and unicolorous or with areas of infuscation. SURFACE AND VESTITURE (fig. 64A–C, pl. 22): Body surface smooth, weakly shining; vestiture either pale or dark, reclining, common setae. STRUCTURE: **Head** (fig. 64A, pl. 22): Moderately broad, sometimes closely conforming to anterior margin of pronotum, eyes variable, sometimes bulging; segment 2 ranging from short and tapering proximally to long and parallel sided. **Thorax** (fig. 64A–C, pl. 22): Pronotum with lateral margins nearly straight, calli weakly demarcated, posterior lobe nearly flat to weakly elevated, posterior margin straight to weakly excavate; mesoscutum narrowly to broadly exposed. Thoracic pleuron as in figure 64D. Pretarsus as in figure 64E, F. *Hemelytron*: Corial margin ranging from distinctly convex to straight. GENITALIA (figs. 65–69, pl. 23): **Pygophore:** Elongate conical, posterior margin truncate, with various arrangement of bristles, usually without tubercles on dorsal surface. **Endosoma:** Small, slender to very slender, sigmoid, length of apical portion variable, dorsal and ventral straps contiguous from base to region of secondary gonopore, dorsal strap forming one apical spine of length approximately equal to length of secondary gonopore, sometimes apical spine bifid; ventral strap reaching to apex of well-sclerotized, subapically placed secondary gonopore. **Phallotheca:** Apical portion narrowly conical, usually without narrow dorsal crest, aperture either on anterior dorsal surface or apical; basal portion reaching to middle of ventral

surface of pygophore in situ. **Parameres:** Variable, sometimes elongate in dorsal view; dorsoposterior margin usually strongly elevated above posterior and anterior processes; posterior process with undulating lateral margin in dorsal view, distal portion straight or deflected; development of anterior process and placement of prominent seta variable. Right paramere of moderate size, usually with two small points apically, rarely with long, narrow medial projection.

Female (pl. 22): Total length 3.04–4.20, pronotum width 0.85–1.22; coloration, vestiture, and body form similar to male. GENITALIA (pl. 51): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, reaching anterior margins of sclerotized rings. *First gonapophyses*: Relatively small or medium-sized quadrate basal blocks, with variable margins. *Ventral labiate plate*: Platelike medial anteroventral extension wider than lateral extent of basal gonapophysal structures, anterior surface undulate or smoothly curved, covering anterior surface of basal structures. **Dorsal labiate plate:** Medium sized, relatively short. *Sclerotized rings*: Medium-sized elongate ovoid, or large triangular; relatively flat, thick walled. *Posteromedial region*: Surface with some microstructure. *Anterolateral region*: Anterior margin extending beyond anterior edge of sclerotized rings, sometimes with strongly undulate or strongly spiculate anterior margin. **Posterior wall:** *Intersegmental structure*: Not differentiated from connecting membrane. *Interramal sclerites*: Moderately sclerotized, lateral sclerites broad, medial sclerite not observed.

Etymology: From the Latin, *omnis*, "all," and *vorare*, "to devour," and the generic name *Phylus*; masculine.

Discussion: The endosomal structure of *Omnivoriphylus* spp. is similar to that of species we place in *Myoporophylus*. We have chosen to maintain these species in separate genera because of the wrinkled integument, large body size, and consistent host preferences in *Myoporophylus*. This decision leaves *Omnivoriphylus* as a group of diverse habitus and host associations, but nonetheless one in which all species have similar endosomal structure.

Omnivoriphylus boiada, new species
Figure 65, map 18, table 1, plates 22, 23

Diagnosis: Recognized by greenish to pale coloration with a contrasting dark spot on corium at inner angle of cuneus and at apex of membrane cells, elongate oval body (pl. 22), and slender endosoma with a single, undulating apical spine (fig. 65, pl. 23). Sexual dimorphism weak. Most similar to *O. mangaensis* in ovoid form of body, but *O. boiada* with a single, slender, sinuous, apical spine and *O. mangaensis* with two spines of unequal length, shorter one with a flattened apex; body form in *O. charleville* more strongly elongate and endosoma with a short tubercle on dorsal surface at level of proximal margin of secondary gonopore.

Description: *Male*: Body form elongate ovoid; mean total length 4.19, mean pronotum width 1.12. COLORATION (pl. 22): Pale, nearly transparent, with dark spot on corium at inner angle of cuneus and on membrane at apex of cells. SURFACE AND VESTITURE (pl. 22): Body surface smooth, weakly shining; vestiture of pale, reclining, common setae. STRUCTURE: **Head** (pl. 22): Moderately broad, closely conforming to anterior margin of pronotum, eyes weakly bulging; frons weakly projecting beyond anterior margin of eye; eye occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye emarginate at insertion, antennal segment 2 relatively short, stout, parallel sided (1.01), 1.18 times width of head; labium surpassing apex of metacoxa and reaching onto abdomen. **Thorax** (pl. 22): Pronotum with posterior margin weakly excavated; mesoscutum broadly exposed. *Hemelytron*: Corial margin weakly convex. GENITALIA (fig. 65, pl. 23): **Pygophore:** Two clumps of bristles ventrad of left paramere insertion. **Endosoma:** Dorsal strap extending beyond secondary gonopore as narrow slender undulating spine; ventral strap terminating just distad of gonopore as reflected hooplike sclerite. **Phallotheca:** Apical portion without dorsal crest; compressed ovoid aperture situated on anterior dorsal surface and reaching to apex; basal portion with long, narrow internal sclerite on right side. **Parameres:** Left paramere relatively short in dorsal view, dorsoposterior margin

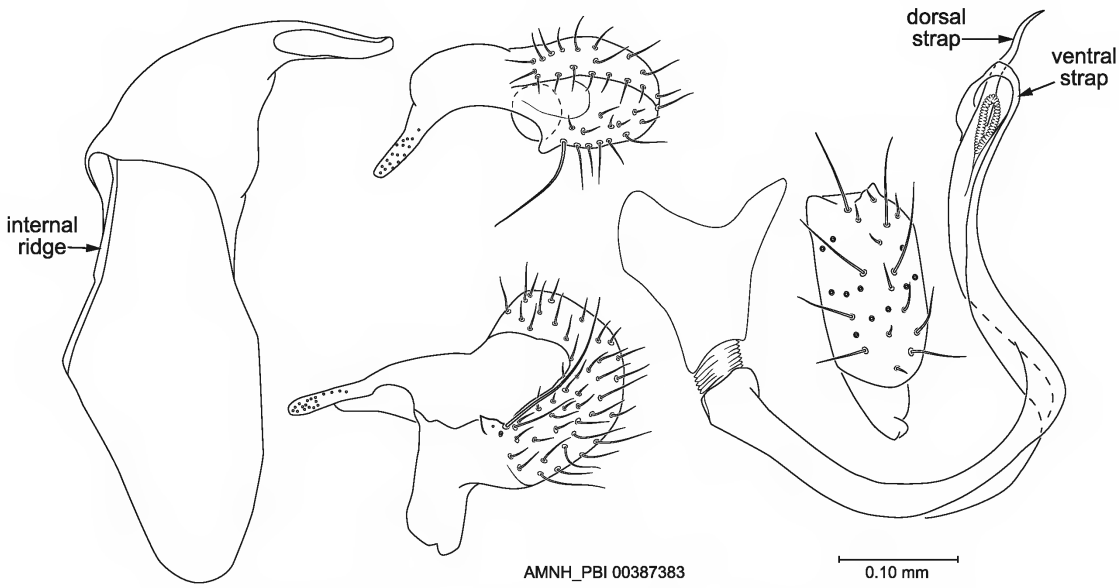


Fig. 65. Male genitalic structures of *Omnivoriphylus boiada*.

inflated and strongly elevated above posterior and anterior processes; apical portion of posterior process moderately long, straight; anterior process reduced to minute spine; prominent seta placed lateral of anterior point. Right paramere width gradually expanded toward apex, with prominent posterior angle and small point adjacent to anterior angle.

Female (pl. 22): Coloration as in male; body form ovoid; eyes smaller, vertex relatively broader than in male; mean total length 3.83, mean pronotum width 1.16.

Etymology: Named after Boiada Camp, Western Australia, near the type locality; a noun in apposition.

Host: Recorded from *Eremophila forrestii* (pl. 37G) (Scrophulariaceae).

Distribution (map 18): Known from Boiada and Lochada, Pilbara District, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Lochada, Mungada Rd just W of turnoff to Boiada Camp, 29.18108°S 116.5003°E, 272 m, 19 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. *forrestii* (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387385) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Lochada, Boiada Camp, 29.19661°S 116.51489°E, 312 m, 16 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. *forrestii* (Scrophulariaceae), det. WA Herbarium, 1♂ (00387478), 1♀ (00387479) (AMNH); 20 Sep 2009, C. Symonds, 2♂ (00387389, 00387390), 1♀ (00387399) (AMNH), 3♀ (00387397, 00387398, 00387400) (UNSW). Lochada, Mungada Rd just W of turnoff to Boiada Camp, 29.18108°S 116.5003°E, 272 m, 19 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♀ (00387396), 1♂ (00387383) (AMNH), 1♂ (00387386) (UNSW), 1♂ (00387384) (WAMP). Lochada, track due W. of Kelly Well, 29.08152°S 116.5543°E, 406 m, 15 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. *forrestii* (Scrophulariaceae), det. WA Herbarium, 1♂ (00387388), 3♀ (00387391, 00387392, 00387394) (UNSW), 1♂ (00387387), 2♀ (00387393, 00387395) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** Lochada, track due W. of Kelly Well, 29.08152°S 116.5543°E, 406 m, 15 Sep 2009, C. Symonds, *Eremophila forrestii* F. Muell. *forrestii* (Scrophulariaceae), det. WA Herbarium, 7 nymphs (00387401–00387407) (UNSW).

Omnivoriphylus charleville, new species
Figure 66, map 18, table 1, plates 22, 23

Diagnosis: Recognized by the weakly elongate, parallel-sided body form, the dirty

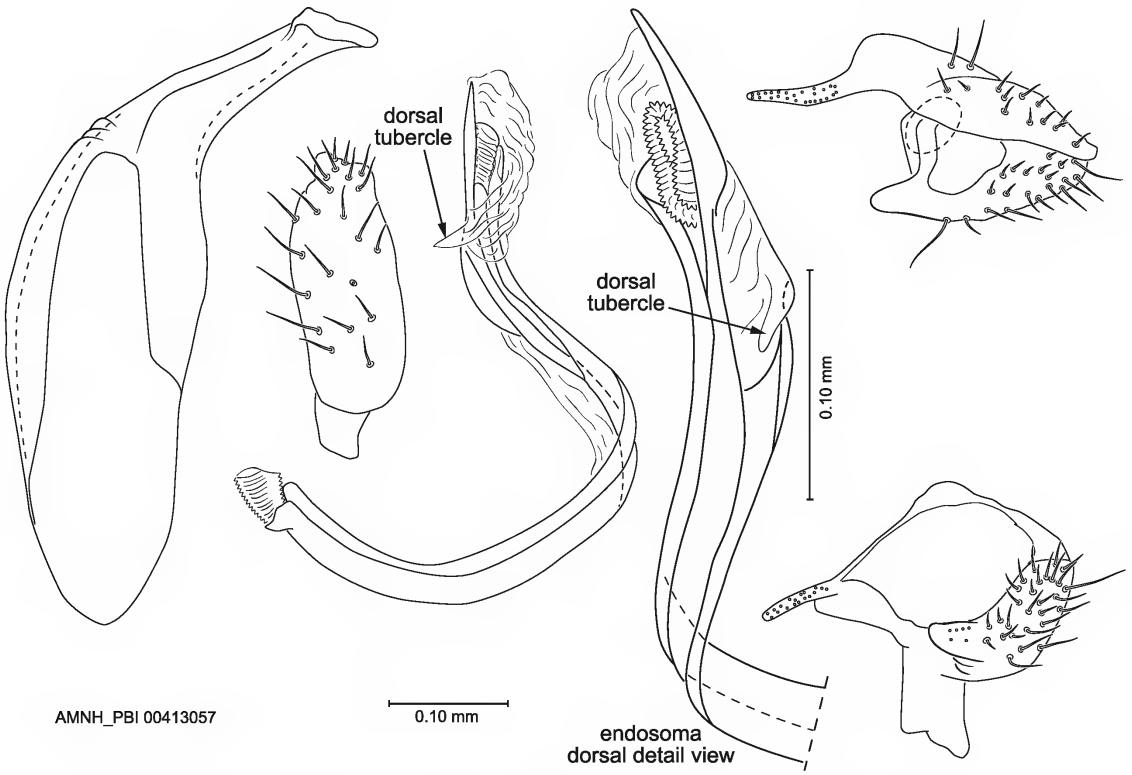


Fig. 66. Male genitalic structures of *Omnivoriphylus charleville*.

yellow overall coloration (in preserved specimen), the dark spot on corium at inner angle of the cuneus, the dark spot at the apex of the membrane cells (pl. 22), and the endosoma with a single straight, apical spine and a smooth-margined membranous envelope containing the apical tubercle and the secondary gonopore with a short, erect spine on the dorsal surface (fig. 66, pl. 23). Coloration and markings most similar to *O. boiada* and *O. mangaensis*, but body form more strongly elongate, apical endosomal spine in those species undulating rather than straight as in *O. charleville*, and *O. mangaensis* with a second, apically flattened, spine arising just distad of secondary gonopore.

Description: *Male*: Mean total length 4.40, mean pronotum width 1.12. COLORATION (pl. 22): Dirty yellow (in preserved specimen), translucent, with distinct dark spot on corium at inner angle of cuneus and on membrane at apex of cells. SURFACE AND VESTITURE (pl. 22): Body surface smooth, weakly shining; vestiture of pale, reclining, common setae. STRUCTURE: **Head** (pl. 22): Moderately broad, not closely conforming to anterior margin of pronotum, eyes weakly bulging; eye occupying slightly less than three-quarters height of head; antennae inserted even with ventral margin of eye; antennal segment 2 relatively long, parallel sided (1.16), 1.45 times width of head; labium reaching apex of metacoxa. **Thorax** (pl. 22): Pronotum with posterior margin weakly excavated, mesoscutum broadly exposed. *Hemelytron*: Corial margin weakly convex. GENITALIA (fig. 66, pl. 23): **Pygophore:** With diffuse bristles. **Endosoma:** Dorsal strap with straight apical spine extending beyond secondary gonopore by length subequal to gonopore; ventral strap with sclerotized region terminating just beyond distal end of gonopore, apically with membranous sheath conforming to endosomal contour; dorsal surface of sheath with moderately long suberect tubercle. **Phallotheca:** Apical portion well sclerotized, long

and narrow; dorsal surface without crest; small ovoid aperture with slightly flared margin situated on anterior dorsal surface; basal portion with strongly sclerotized margins. **Parameres:** Left paramere with somewhat elongate typically phyline form; dorsoposterior margin strongly elevated above posterior and anterior processes; posterior process relatively long in dorsal view; anterior process comparatively long, apically rounded; prominent seta placed laterad of process. Right paramere with roughly uniform, apically constricted and truncate with a rounded protuberance on posterior angle.

Female: Unknown.

Etymology: Named after Charleville, southern Queensland, Australia, near the type locality; a noun in apposition.

Host: Recorded from *Eremophila freelingii* (pl. 37H, I) (Scrophulariaceae).

Distribution (map 18): Known only from the type locality near Charleville, southern Queensland.

Discussion: The endosoma and the rest of the male genitalia are nearly identical in the single known specimens of *O. charleville* and *O. wanarra*. We nonetheless treat these as separate taxa because of their distinctive shape, coloration, wide geographical disjunction, and different recorded hosts.

Holotype: **AUSTRALIA: Queensland:** 14.2 km E of Charleville, 26.42171°S 146.3756°E, 375 m, 31 Oct 1998, Schuh, Cassis, Silveira, *Eremophila freelingii* F. Muell. (Scrophulariaceae), det. Royal Bot. Gard. NSW NSW427507, 1♂ (00413057) (QM).

Omnivoriphylus frankenii, new species
Figure 67, map 18, table 1, plates 22, 23, 51B, D, F

Diagnosis: Recognized by the small size, elongate, slender, parallel-sided body form, and bulging eyes; coloration dirty yellow, membrane infuscate with contrasting white veins (pl. 22); endosoma with two apical spines of subequal length, the longer spine undulating (fig. 67, pl. 23); left paramere with an undulating posterior process, a very strongly elevated anterior margin, and a vestigial anterior process; right paramere asymmetrically lanceolate with a long fingerlike apical projection (fig. 67). Female elongate ovoid and with conspicuously smaller eyes than male (pl. 22). Paramere morphology distinctive among species *Omnivoriphylus* spp.

Description: *Male*: Small, elongate, parallel sided; mean total length 3.35, mean pronotum width 0.87. COLORATION (pl. 22): Pale, weakly yellow, opaque, with weak dark spot on corium at inner angle of cuneus and stronger spot on membrane at apex of cells. SURFACE AND VESTITURE (pl. 22): Body surface smooth, dull; vestiture of dark, reclining, common setae. STRUCTURE: **Head** (pl. 22): Broad, closely conforming to anterior margin of pronotum, eyes bulging in dorsal view, eye occupying two-thirds height of head in lateral view; antennae inserted just above ventral margin of eye, eye emarginate above insertion; antennal segment 2 relatively short, robust, and of uniform diameter (1.02), 121 times width of head; labium reaching apex of mesocoxa. **Thorax** (pl. 22): Pronotum with lateral margins nearly straight, calli weakly demarcated, posterior lobe nearly flat to weakly elevated, posterior margin weakly excavated, mesoscutum narrowly exposed. *Hemelytron*: Corial margin straight, cuneus moderately elongate. GENITALIA (fig. 67, pl. 23): **Pygophore:** Majority of surface with relatively dense suberect setae; left dorsal surface with low mound anteriad of aperture. **Endosoma:** Sigmoid, of uniform width over most of length, dorsal strap extending to secondary gonopore then bifid with tapered, sharply pointed, apically diverging spines of length approximately equal to secondary gonopore; ventral strap terminating at apex of narrow secondary gonopore. **Phallotheca:** Apical portion without crest; narrow slitlike aperture situated on anterior surface continuing around apex; basal portion broad and long. **Parameres:** Left paramere elongate in dorsal view; anterolateral surface strongly elevated above anterior and posterior processes, posterior process undulating in dorsal and lateral views, swollen and produced laterad at midpoint; anterior process vestigial, rounded, continuous with paramere contour; prominent seta placed on anterolateral edge. Right paramere asymmetrically lanceolate, terminating in long narrow apical spine.

Female (pl. 22): Coloration as in male; body form very elongate ovoid; eyes somewhat

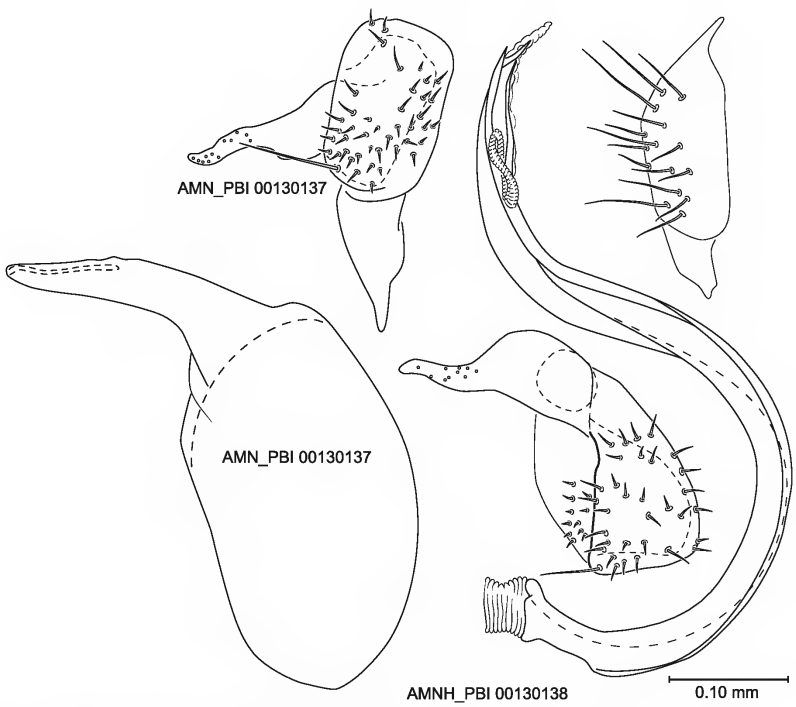


Fig. 67. Male genitalic structures of *Omnivoriphylus frankenii*.

smaller, vertex relatively wider than in male; mean total length 3.09, mean pronotum width 0.88. GENITALIA as in plate 51B, D, F.

ETYMOLOGY: Named after the genus *Frankenia* (Frankeniaceae), host of all known specimens of this taxon.

HOST: Recorded from *Frankenia* sp. (Frankeniaceae).

DISTRIBUTION (map 18): Known only from the type locality northwest of Quilpie, southwestern Queensland.

DISCUSSION: In repose the apical portion of the phallotheca rests tucked under and hidden by the anterior margin of the dorsoposterior margin of the left paramere.

HOLOTYPE: **AUSTRALIA: Queensland:** 82.6 km NW of Quilpie, 26.3479°S 143.6454°E, 190 m, 03 Nov 1998, Schuh, Cassis, Silveira, *Frankenia* sp. (Frankeniaceae), det. Royal Bot Gard. NSW NSW427347, 1♂ (AMNH_PBI 00130124) (QM).

PARATYPES: **AUSTRALIA: Queensland:** 82.6 km NW of Quilpie, 26.3479°S 143.6454°E, 190 m, 03 Nov 1998, Schuh, Cassis, Silveira, *Frankenia* sp. (Frankeniaceae), det. Royal Bot Gard. NSW NSW427347, 3♂ (00130128, 00130129, 00389925), 29♀ (00130177–00130182, 00389926-00389938, 00389945-00389950, 00389920-00389923) (AM), 12♂ (00130123, 00130125–00130127, 00130130, 00130132, 00130134–00130138, 00087518), 41♀ (00130139–00130142, 00130145–00130176, 00130183, 00130185, 00130189, 00130143, 00130144) (AMNH), 2♂ (00130131, 00130133), 4♀ (00130184, 00130186–00130188) (QM).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Queensland:** 82.6 km NW of Quilpie, 26.3479°S 143.6454°E, 190 m, 03 Nov 1998, Schuh, Cassis, Silveira, *Frankenia* sp. (Frankeniaceae), det. Royal Bot Gard. NSW NSW427347, 5 nymphs (00389951-00389954, 00389924) (AM), 1 nymph (00411922), 2 adults, sex unknown (00411923, 00411924) (AMNH).

Omnivoriphylus mangaensis, new species
Figures 64, 68, map 18, table 1, plates 22, 23, 51A, C, E

DIAGNOSIS: Recognized by yellowish to pale coloration with a strong, contrasting dark

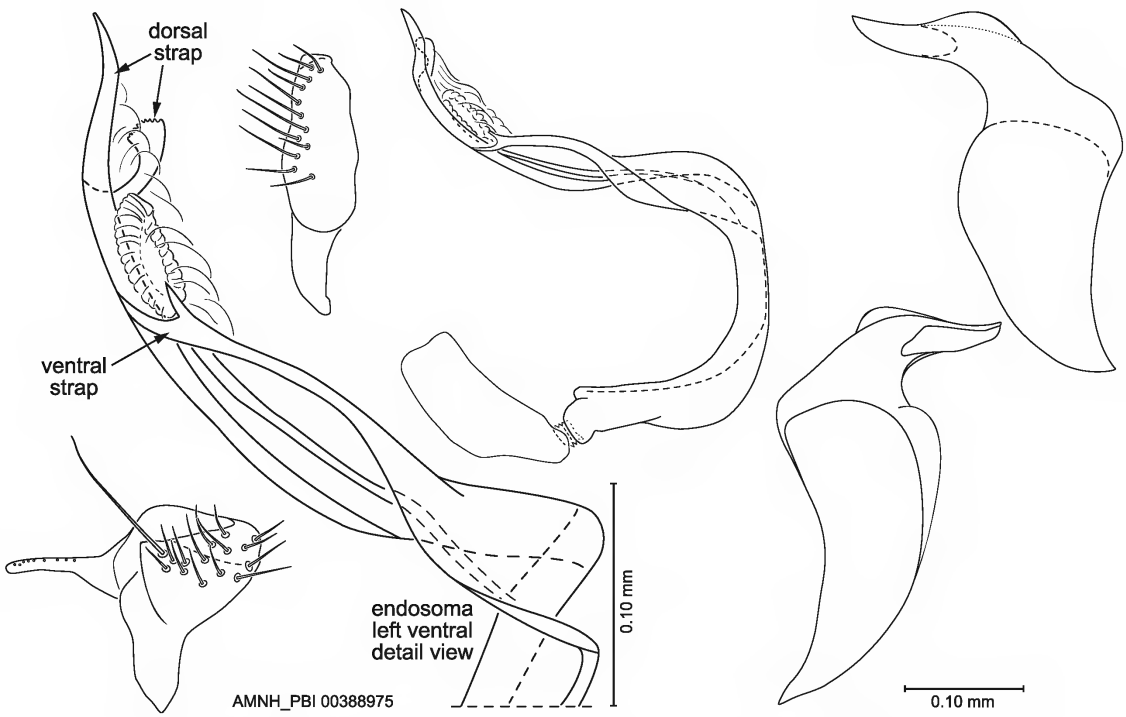


Fig. 68. Male genitalic structures of *Omnivoriphylus mangaensis*.

spot on corium at inner angle of cuneus, elongate oval body (pl. 22), and endosoma with a longer undulating apical spine and a shorter capitate (apically flattened) spine (fig. 68, pl. 23). Sexual dimorphism weak. Most similar to *O. boiada* in ovoid form of body, but *O. mangaensis* with two spines of unequal length, the shorter one with a flattened apex, rather than a single, slender, sinuous, apical spine as in *O. boiada*; body form in *O. charleville* more strongly elongate and endosoma with a short tubercle on dorsal surface at level of proximal margin of secondary gonopore.

Description: *Male*: Elongate ovoid; mean total length 4.46, mean pronotum width 1.06. COLORATION (pl. 22): Pale, dirty yellow (in preserved specimens), almost transparent, with strong dark spot on corium at inner angle of cuneus and weak spot on membrane at apex of cells. SURFACE AND VESTITURE (fig. 64A–C, pl. 22): Body surface smooth, weakly shining; vestiture of pale, reclining, common setae. STRUCTURE: **Head** (fig. 64A, pl. 22): Not closely conforming to anterior margin of pronotum, eyes weakly bulging; eye occupying two-thirds height of head; antennae inserted just above ventral margin of eye, eye emarginate above insertion; antennal segment 2 relatively short, stout, weakly tapering proximally (1.08), 1.40 times width of head; labium reaching posterior margin of mesosternum. **Thorax** (pl. 22): Pronotum flat, humeral angles slightly projecting, posterior margin weakly excavated, mesoscutum broadly exposed. Thoracic pleuron as in figure 64D). Pretarsus as in figure 64E, F. *Hemelytron*: Corial margin weakly convex. GENITALIA (fig. 68, pl. 23): **Pygophore:** With a long bristle on either side of ventrad of aperture. **Endosoma:** Dorsal and ventral straps diverging medially, confluent at level of secondary gonopore; dorsal strap bifid distad of secondary gonopore, forming one longer, sharply pointed, curved spine and one shorter capitate spine; ventral strap terminating proximal of secondary gonopore with short, pointed, bifid apex. **Phallotheca:** Apical portion with prominent short crest; compressed ovoid aperture situated on anterior surface. **Parameres:** Left

paramere with typical phyline form; dorsoposterior margin slightly elevated above posterior and anterior processes; anterior process short, prominent seta placed on lateral surface of lobe. Right paramere with subparallel undulating margins and a truncate apex.

Female (pl. 22): Coloration as in male; somewhat more strongly ovoid than male; mean total length 4.00, mean pronotum width 1.07. GENITALIA as in plate 51A, C, E.

Etymology: Derived from Manga Road, a locality in Western Australia where many of the known specimens were collected.

Hosts: Recorded from *Eremophila clarkei* (pl. 37D, E), *E. oldfieldii*, and *Eremophila* sp. (Scrophulariaceae).

Distribution (map 18): Known from the central coast of Western Australia and adjacent inland areas.

Discussion: The twist in the endosoma of this taxon is reminiscent of some species of *Gryophallus* (e.g., *G. karara*), but without the billowy apical membrane and the divergent spines.

Holotype: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, granite outcrop SW of homestead, 29.59261°S 116.94791°E, 312 m, 21 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387495) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 24 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.39014°S 114.0094°E, 60 m, 26 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. PERTH staff PERTH6989829, 1♀ (00388970) (AM). 26 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.26835°S 113.8491°E, 15 m, 25 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. Field ID, 1♂ (00388975) (AMNH). Charles Darwin Reserve, Wanarra Rd at breakaway, 29.57861°S 117.03363°E, 292 m, 23 Sep 2009, C. Symonds, *Eremophila oldfieldii* F. Muell. (Scrophulariaceae), det. WA Herbarium, 2♂ (00413982, 00413983), 2♀ (00413986, 00413987) (AMNH), 6♂ (00387462–00387464, 00413980, 00413981, 00413984), 10♀ (00387465, 00387466, 00413985, 00413988–00413994), 6♂ (00387462–00387464, 00413980, 00413981, 00413984), 10♀ (00387465, 00387466, 00413985, 00413988–00413994) (UNSW), 2♀ (00413995, 00413996) (WAMP). Charles Darwin Reserve, granite outcrop SW of homestead, 29.59261°S 116.94791°E, 312 m, 21 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 4♂ (00387500–00387502, 00387513), 1♀ (00387507) (AMNH), 7♂ (00387492–00387494, 00387496–00387499), 7♀ (00387504–00387506, 00387508–00387511) (UNSW), 1♂ (00387503), 1♀ (00387512) (WAMP). Charles Darwin Reserve, track to Seven Mile Well, N of Wanarra Rd, 29.57413°S 117.02055°E, 326 m, 24 Sep 2009, C. Symonds, 1♂ (00387412), 1♀ (00387423) (AMNH), 1♀ (00387421) (ANIC), 4♂ (00387408–00387411), 3♀ (00387418–00387420) (UNSW), 1♀ (00387422) (USNM). Charles Darwin Reserve, track to White Dam, 29.68594°S 116.92094°E, 307 m, 22 Sep 2009, C. Symonds, 1♂ (00387451) (UNSW). Charles Darwin Reserve, track to White Dam, 29.60866°S 116.92169°E, 319 m, 22 Sep 2009, C. Symonds, *Eremophila* sp. (Scrophulariaceae), det. WA Herbarium, 1♀ (00414150) (AMNH), 2♂ (00387467, 00387468), 4♀ (00414145–00414148) (UNSW), 1♀ (00414149) (WAMP). Lochada, Mungada Rd just E of turnoff to Boiada Camp, 29.18225°S 116.53711°E, 251 m, 19 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♀ (00414048) (CNC), 4♂ (00387452, 00414043–00414045), 2♀ (00414046, 00414047) (UNSW), 1♀ (00414049) (ZISP). Lochada, on track due W of Kelly Well, 29.08177°S 116.5725°E, 294 m, 17 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 3♂ (00387414, 00387415, 00387417) (AMNH), 1♂ (00387413) (UNSW), 1♂ (00387416) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, granite outcrop SW of homestead, 29.59261°S 116.94791°E, 312 m, 21 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 5 nymphs (00387514–00387518) (UNSW). Charles Darwin Reserve, track to White Dam, 29.60866°S 116.92169°E, 319 m, 22 Sep 2009, C. Symonds, *Eremophila* sp. (Scrophulariaceae),

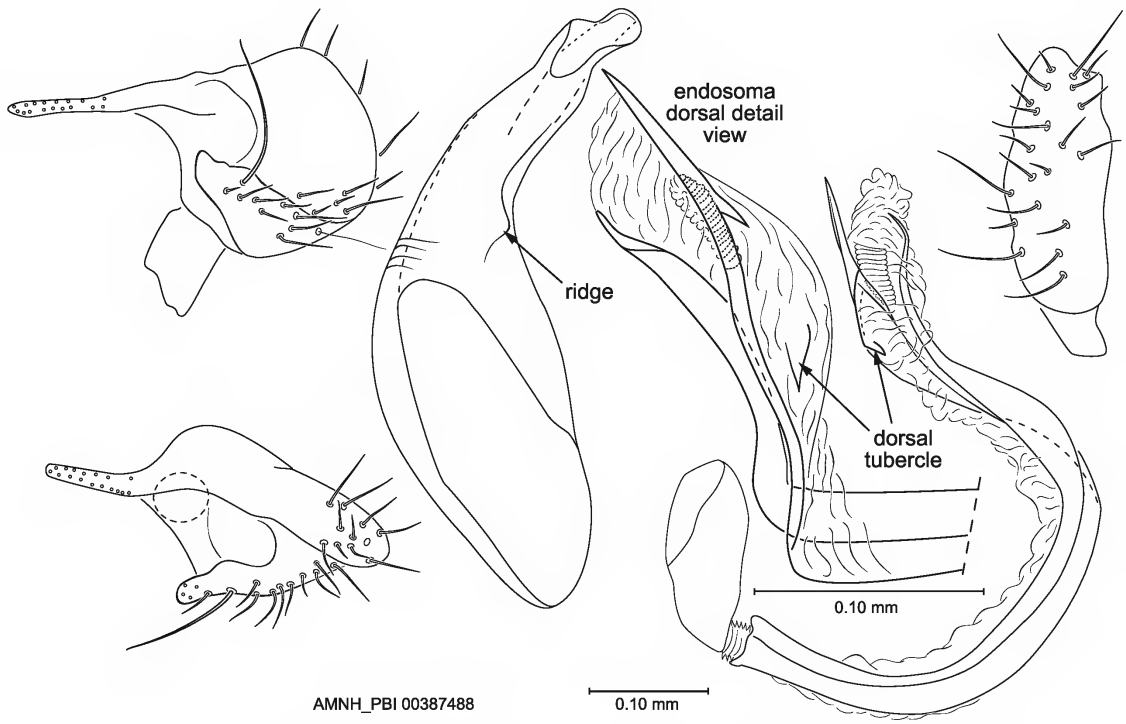


Fig. 69. Male genitalic structures of *Omnivoriphylus wanarra*.

det. WA Herbarium, 2 nymphs (00414151, 00414152) (UNSW).

Omnivoriphylus wanarra, new species
Figure 69, map 18, table 1, plates 22, 23

DIAGNOSIS: Recognized by the very elongate, parallel-sided body, green/yellow exocorium, weakly orange cuneus, strongly infuscate clavus and membrane (head and pronotum somewhat less so) (pl. 22), and endosoma with a single straight apical spine surrounded by an irregular membranous sheath supporting a short reflected tubercle (fig. 69, pl. 23). Coloration unique among known Australian Cremnorrhinina; single straight, apical endosomal spine most similar in structure to that seen in *O. charleville* but two species easily separated by strongly differing coloration and minute differences in male genitalia.

DESCRIPTION: *MALE*: Large, elongate, parallel sided; mean total length 4.40, mean pronotum width 1.12. COLORATION (pl. 22): Head and pronotum pale, green/yellow, exocorium mostly yellow, cuneus weakly orange; clavus infuscate, corium strongly fumose; hemelytron opaque, with weak dark spot on corium at inner angle of cuneus and stronger spot
on membrane at apex of cells. SURFACE AND VESTITURE (pl. 22): Body surface smooth, weakly shining; vestiture of dark, reclining, common setae. STRUCTURE: **Head** (pl. 22): Appearing narrow, weakly conforming to anterior margin of pronotum, eyes bulging; eye occupying two-thirds height of head; antenna inserted about width of fossa above ventral margin of eye; antennal segment 2 long, robust, and of uniform diameter (1.21), 1.59 times width of pronotum; labium just surpassing posterior margin of mesosternum. **Thorax** (pl. 22): Pronotum with lateral margins nearly straight, calli weakly demarcated, posterior lobe weakly elevated, posterior margin weakly excavated; mesoscutum moderately exposed. *Hemelytron*: Corial margin nearly straight, cuneus strongly elongate. GENITALIA (fig. 69, pl. 23): **Pygophore:** Left surface with several relatively long bristles ventrad of aperture. **Endosoma:** Dorsal strap with straight apical spine extending

beyond secondary gonopore by length of gonopore; ventral strap with sclerotized region terminating at distal end of gonopore, distally with membranous sheath conforming to endosomal contour; dorsal surface of sheath with short reflected tubercle. **Phallotheca:** Apical portion well sclerotized, long, and narrow; dorsal surface without crest; medium-sized, ovoid aperture with slightly flared margin situated on anterior dorsal surface; base of apical portion with small outpocket on left side of anterior surface; basal portion with strongly sclerotized margins. **Parameres:** Left paramere with somewhat elongate typically phyline form; dorsoposterior margin strongly raised dorsad of posterior and anterior processes; posterior process relatively long; anterior process comparatively long, prominent seta placed laterad of anterior process. Right paramere with roughly uniform width and with small square-edged apex.

Female: Unknown.

Etymology: Named after Wanarra Road, Charles Darwin Nature Reserve, Western Australia; a noun in apposition.

Host: Recorded from *Eremophila clarkei* (pl. 37D, E) (Scrophulariaceae).

Distribution (map 18): Known only from the type locality in the Charles Darwin Reserve, about 350 km NNE of Perth, Western Australia.

Discussion: See discussion under *O.* charleville.

Holotype: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, track to Seven Mile Well, N of Wanarra Rd, 29.57413°S 117.02055°E, 326 m, 24 Sep 2009, C. Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00387488) (WAMP).

Proteophylus, new genus

Type Species: *Proteophylus grevilleae,* new species.

Diagnosis: Recognized by the compact ovoid body form and relatively small size; head relatively small, eyes and frons usually bulging, clypeus usually visible from above; coloration variable, from entirely black to entirely pale; antennal segment 2 in male variable, often swollen, sometimes only apically, but also often terete (pl. 24); endosoma usually with dorsal strap terminating at about level of secondary gonopore and ventral strap with single apical spine of varying configuration, weakly to rather strongly surpassing secondary gonopore (figs. 71–75, pl. 25). Structure and coloration similar in both male and female. Along with *Dicyphylus* an *Telophylus eremophilae*, distinctive among Australian Cremnorrhinina in having a compact, tubular body; body form more robust and not so elongate as *Dicyphylus* spp. and *T. eremophilae*; endosoma without spine subtending secondary gonopore as in *Dicyphylus* or conspicuous microtrichiate plates as in *T. eremophilae*.

Description: *Male*: Total length 2.30–3.18, pronotum width 0.74–1.13. COLORATION (pl. 24): Ranging from largely pale yellow (in preserved specimens) to almost completely black; antennal coloration variable, sometimes as body coloration, but often black, or with rings. SURFACE AND VESTITURE (pl. 24): Dorsum usually smooth, ranging from dull to shining, sometimes granular and dull; dorsal vestiture with recumbent simple setae, pale or dark, sometimes also with lepidote setae (fig. 70B, C), very easily removed during collecting). STRUCTURE: Body form robust, not so strongly flattened as many Australian Cremnorrhinina. **Head** (fig. 70A, pl. 24): Globular with protuberant globular eyes; frons weakly to strongly swollen, frons sometimes projecting well beyond anterior margin of eye in dorsal view and clypeus distinctly protruding in dorsal view. *Antenna*: Segment 1 often robust, segment 2 slender to strongly terete, segments 3 and 4 much more slender than preceding two segments. **Thorax** (fig. 70A, D, pl. 24): Pronotum ranging from nearly flat to posterior lobe being conspicuously elevated, lateral and posterior margins moderately concave to nearly straight; calli weakly to distinctly elevated, posterior margin straight to weakly concave; mesoscutum barely to moderately exposed. Thoracic pleuron as in figure 70C. Pretarsus as in figure 70E, F. *Hemelytron*: Corial margin weakly to distinctly convex; cuneus short and broad. GENITALIA (figs. 70F, 71–75, pl. 25): **Pygophore:** Broadly conical, posterior margin relatively pointed; dorsal surface without tubercles or clumps of bristles. **Endosoma:** Sigmoid, with dorsal and ventral straps

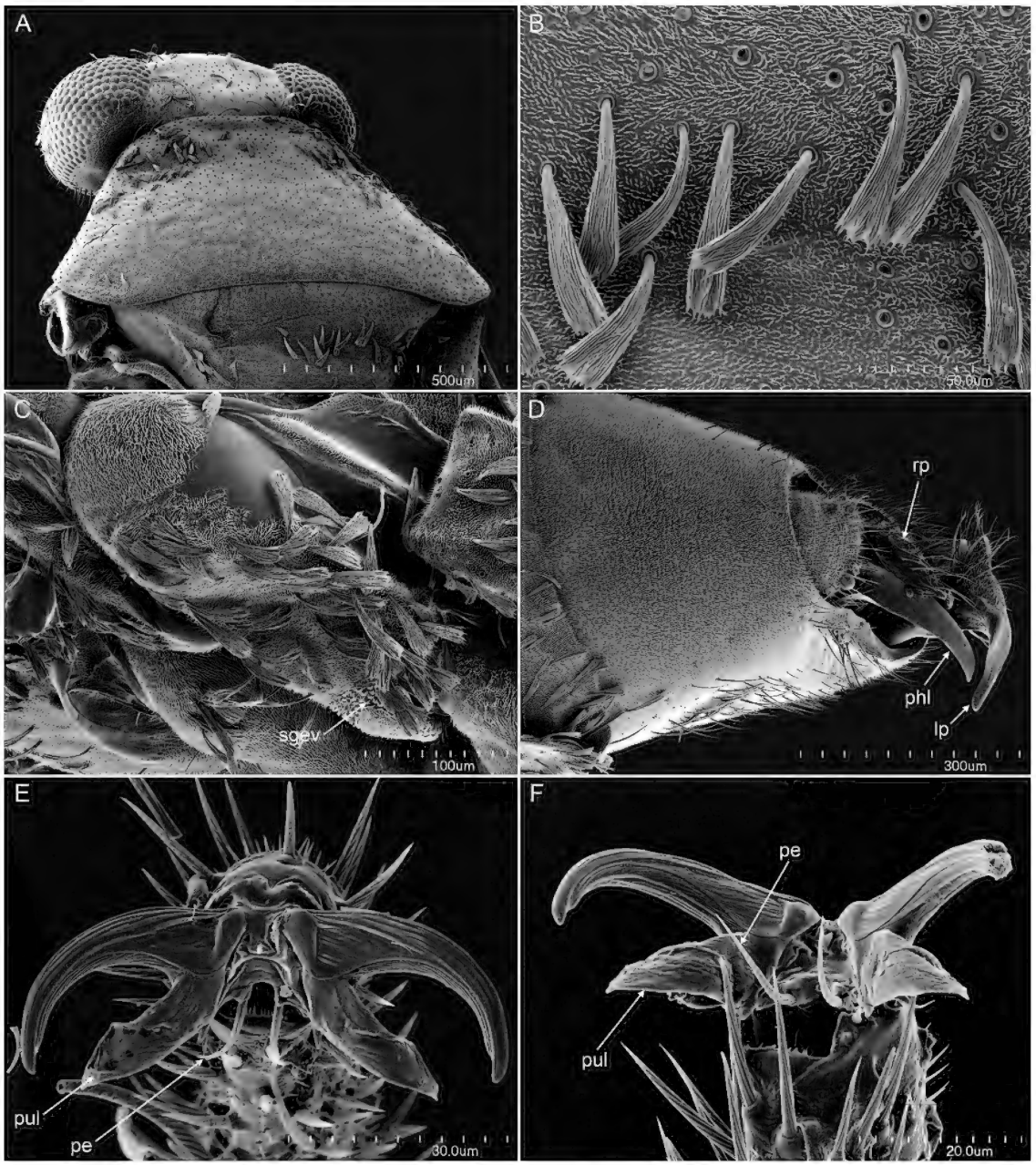
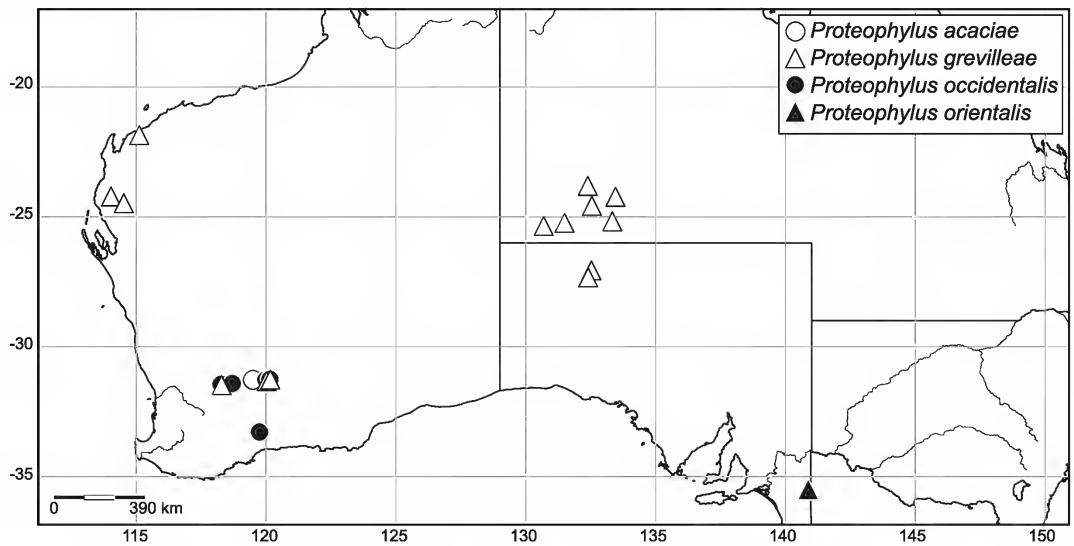


Fig. 70. *Proteophylus grevilleae*. Scanning electron micrographs. **A.** Dorsal view of head and pronotum. **B**. Detail of lepidote setae on pronotum. **C.** Thoracic pleuron, showing lepidote setae and metathoracic spiracle opening, metathoracic scent-gland auricle, and evaporatory area. **D.** Dorsolateral view of pygophore. **E.** Frontal view of pretarsus. **F.** Ventral view of pretarsus. Abbreviations: **lp,** left paramere; **pe**, parempodium; **phl,** phallotheca; **pul**, pulvillus; **rp,** right paramere; **sgev,** scent gland evaporatory area.

usually contiguous from base to secondary gonopore, medial width and length distad of secondary gonopore variable; secondary gonopore at base of apical spines and usually well sclerotized, rarely with apical extension; ventral strap usually terminating at about level of secondary gonopore and dorsal strap narrow, pointed with



Map 19. Distribution of *Proteophylus* spp.

variable length apical spine; thin apical membrane of limited extent. **Phallotheca:** Apical portion narrowly conical, usually with short, narrow crest, rarely with small additional crest; aperture on anterior surface, usually with somewhat broad apex with undulating margin; basal portion reaching to middle of ventral surface of pygophore in situ. **Parameres:** Left paramere typically phyline; dorsoposterior margin usually straight and barely elevated above posterior and anterior processes; posterior process short, slightly undulating laterally, straight apically; anterior process relatively long, prominent seta usually placed on lateral margin of anterior process. Right paramere roughly lanceolate in shape and with small apical point on near midpoint of apical margin or closer to posterior angle.

Female (pl. 24): Sexual difference indicated under individual species; total length 2.17–3.49, pronotum width 0.73–1.26. GENITALIA (pl. 52): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, reaching anterior margins of sclerotized rings. *First gonapophyses*: Relatively small or medium-sized quadrate basal blocks, with rounded margins. *Ventral labiate plate*: Platelike medial anteroventral extension relatively long, width and anterior extent variable, narrowly prominent or wide and gently curved; anterior surface smoothly curved, covering anterior surface of basal structures. **Dorsal labiate plate:** Medium size, medium length. *Sclerotized rings*: Small subovoid, widely separated with sclerotized extension on posterior angle or medium sized and subtriangular; gently concave, thick walled. *Posteromedial region*: Surface with obvious microstructure. *Anterolateral region*: Anterior margin just extending beyond anterior edge of sclerotized rings. **Posterior wall:** *Intersegmental structure*: With broad, transverse outpocket on dorsal surface of connecting membrane. *Interramal sclerites*: Strongly sclerotized, lateral sclerites relatively broad, medial sclerite strongly extending ventrad.

Etymology: From the generic name *Protea*, in reference to its frequent occurrence on the Proteaceae, and the generic name *Phylus*; masculine.

Discussion: In our diagnosis above we compare *Proteophylus* with *Dicyphylus*. It is worth noting that this comparison applies not only to morphology of preserved specimens but also to the bugs in life. Our greatest numbers of collecting events apply to *Proteophylus grevilleae*, which on all occasions appeared deceptively dicyphinelike in appearance, although the very rapid movements of these bugs are not necessarily like those seen in the Dicyphini.

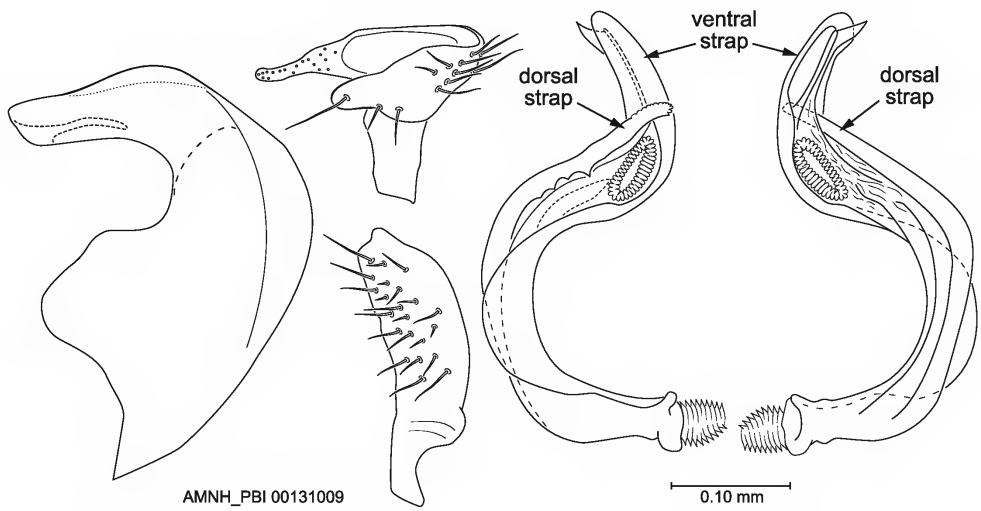


Fig. 71. Male genitalic structures of *Proteophylus acaciae*.

Proteophylus acaciae, new species
Figure 71, map 19, table 1, plates 24, 25

DIAGNOSIS: Recognized by the small size, somewhat flattened body form, entirely black coloration, and reclining simple setae on dorsum; antennal segment 2 weakly swollen (pl. 24); endosoma narrow beyond small secondary gonopore, with small, somewhat hooked apical spine and narrow, marginally serrate lateral sclerite, merging with base of hooked spine (fig. 71, pl. 25). Most similar in coloration to *P. grevilleae*, but body more strongly cylindrical in that species, antennal segment 2 swollen, setae on dorsum simple and lepidote rather than just simple, and endosoma with prominent secondary gonopore and region distad of secondary gonopore short with small apical spine and variable field of spicules.

DESCRIPTION: *MALE*: Mean total length 2.33, mean pronotum width 0.76. COLORATION (pl. 24): Almost completely black, including appendages, except for lighter inner angle of cuneus. SURFACE AND VESTITURE (pl. 24): Dorsum smooth, polished, weakly shining; dorsal vestiture with recumbent, simple, dark setae. STRUCTURE: Body form somewhat flattened, not as robust as in most of *Proteophylus* spp. **Head** (pl. 24): Globular, eyes relatively small, weakly protuberant; frons moderately swollen, projecting beyond anterior margin of eye in dorsal view by about one-half diameter of eye; clypeus barely visible in dorsal view; eyes occupying two-thirds height of head in lateral view; antenna inserted at ventral margin of eye, eye emarginate at insertion; labium reaching apex of mesocoxa. *Antenna*: Segment 1 not enlarged, segment 2 slender, of uniform diameter over length, short (length 0.55), 1.06 times width of head. **Thorax** (pl. 24): Pronotum flattened, lateral and posterior margins nearly straight, posterior margin straight; calli weakly elevated; mesoscutum moderately exposed. *Hemelytron*: Corial margin nearly straight. GENITALIA (figs. 70D, 71, pl. 25): **Pygophore:** As in generic description. **Endosoma:** Somewhat bent to left and interstrap region wide medially in dorsal view; ventral strap extending beyond secondary gonopore and terminating in flattened apical plate with short hooked apex; dorsal strap extending beyond secondary gonopore as wide band with serrate right margin, extending distad and merging with ventral strap. **Phallotheca:** Dorsal crest relatively strongly produced. **Parameres:** As in generic description.

FEMALE (pl. 24): Coloration as in male; structure as in male, except eyes somewhat smaller and vertex broader, antennal segment 2 weakly tapered proximally, and cuneus and membrane shorter; mean total length 2.36, mean pronotum width 0.73.

ETYMOLOGY: Named after the fabaceous genus *Acacia*, host of this taxon.

HOST: Recorded from *Acacia rossei* (pl. 33B) (Fabaceae).

DISTRIBUTION (map 19): Known only from the type locality near Southern Cross, southwestern Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** 13 km E of Southern Cross, 31.27367°S 119.4923°E, 400 m, 04 Dec 1997, Schuh, Cassis, Brailovsky, Asquith, *Acacia rossei* F. Muell. (Fabaceae), det. PERTH staff PERTH 05056039, 1♂ (AMNH_PBI 00131004) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 13 km E of Southern Cross, 31.27367°S 119.4923°E, 400 m, 04 Dec 1997, Schuh, Cassis, Brailovsky, Asquith, *Acacia rossei* F. Muell. (Fabaceae), det. PERTH staff PERTH 05056039, 8♂ (00087114, 00087429, 00390189–00390194), 8♀ (00087115, 00390196–00390202) (AM), 6♂ (00131001–00131003, 00131005, 00131006, 00131009), 15♀ (00131010–00131018, 00131024–00131028) (AMNH), 3♂ (00131000, 00131007, 00131008), 4♀ (00131019–00131023) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** 13 km E of Southern Cross, 31.27367°S 119.4923°E, 400 m, 04 Dec 1997, Schuh, Cassis, Brailovsky, Asquith, *Acacia rossei* F. Muell. (Fabaceae), det. PERTH staff PERTH 05056039, 1 nymph (00390195) (AM), 1 nymph (00411921) (AMNH).

Proteophylus grevilleae, new species
Figures 70, 72, map 19, table 1, plates 24, 25, 52A, C, E, G, H

DIAGNOSIS: Recognized by the often entirely black coloration, although some specimens with body and hemelytron with substantial pale areas, and appressed lepidote setae on most of body surface; antennal segment 2 ranging from robust to weakly terete (pl. 24); endosoma short and truncate beyond secondary gonopore, with row of small ventral spinules distad of secondary gonopore and strong subapical spine (fig. 72, pl. 25). Most similar in coloration to *P. acaciae*, but antennal segment 2 in that species not swollen, setae on dorsum simple rather than simple and lepidote, and endosoma with smaller secondary gonopore, region distad of secondary gonopore longer and narrower; body form and antennal structure most similar to *P. occidentalis*.

DESCRIPTION: *MALE*: Mean total length 3.04, mean pronotum width 0.96. COLORATION (pl. 24): Ranging from black with fumose membrane and pale membrane veins to much lighter with basal half of clavus and most of exocorium pale and cuneus weakly orange; antennae always black, although legs lighter in lighter-colored specimens. SURFACE AND VESTITURE (fig. 70A–C, pl. 24): Dorsum smooth, dull; vestiture of recumbent, simple, dark setae and shining lepidote setae, on most of body surface. STRUCTURE (pl. 24): Body form robust, not flattened. **Head:** Globular with protuberant globular eyes; frons weakly swollen, clypeus partially visible in dorsal view; eye occupying four-fifths height of head in lateral view; antenna inserted at ventral margin of eye, eye emarginate at insertion; labium reaching to posterior margin of mesothorax. *Antenna*: Segment 1 enlarged, segment 2 short (0.73), ranging from linear and robust to weakly terete, 1.07 times width of head. **Thorax:** Pronotum with calli weakly elevated, posterior lobe conspicuously elevated, lateral margins weakly concave, posterior margin straight; mesoscutum moderately exposed. Thoracic pleuron as in figure 70C. Pretarsus as in figure 70E, F. *Hemelytron*: Corial margin weakly convex; cuneus short and broad. GENITALIA (figs. 70D, 72, pl. 25): **Pygophore:** As in generic description. **Endosoma:** Distal region with relatively large, ovoid, subapical secondary gonopore and short apical spine; ventral strap terminating in weakly sclerotized band at midpoint of secondary gonopore; dorsal strap with abrupt truncate plate and subapical spine distad of secondary gonopore; ventral surface distad of secondary gonopore with several small spicules; secondary gonopore large with short distal extension. **Phallotheca:** Dorsal crest weakly produced. **Parameres:** As in generic description, except left paramere with anterodorsal margin elevated above anterior process; anterior process slightly upturned.

FEMALE (pl. 24): Coloration and structure as in male; mean total length 2.99, mean pronotum width 1.00. GENITALIA: As in plate 52A, C, E, G, H.

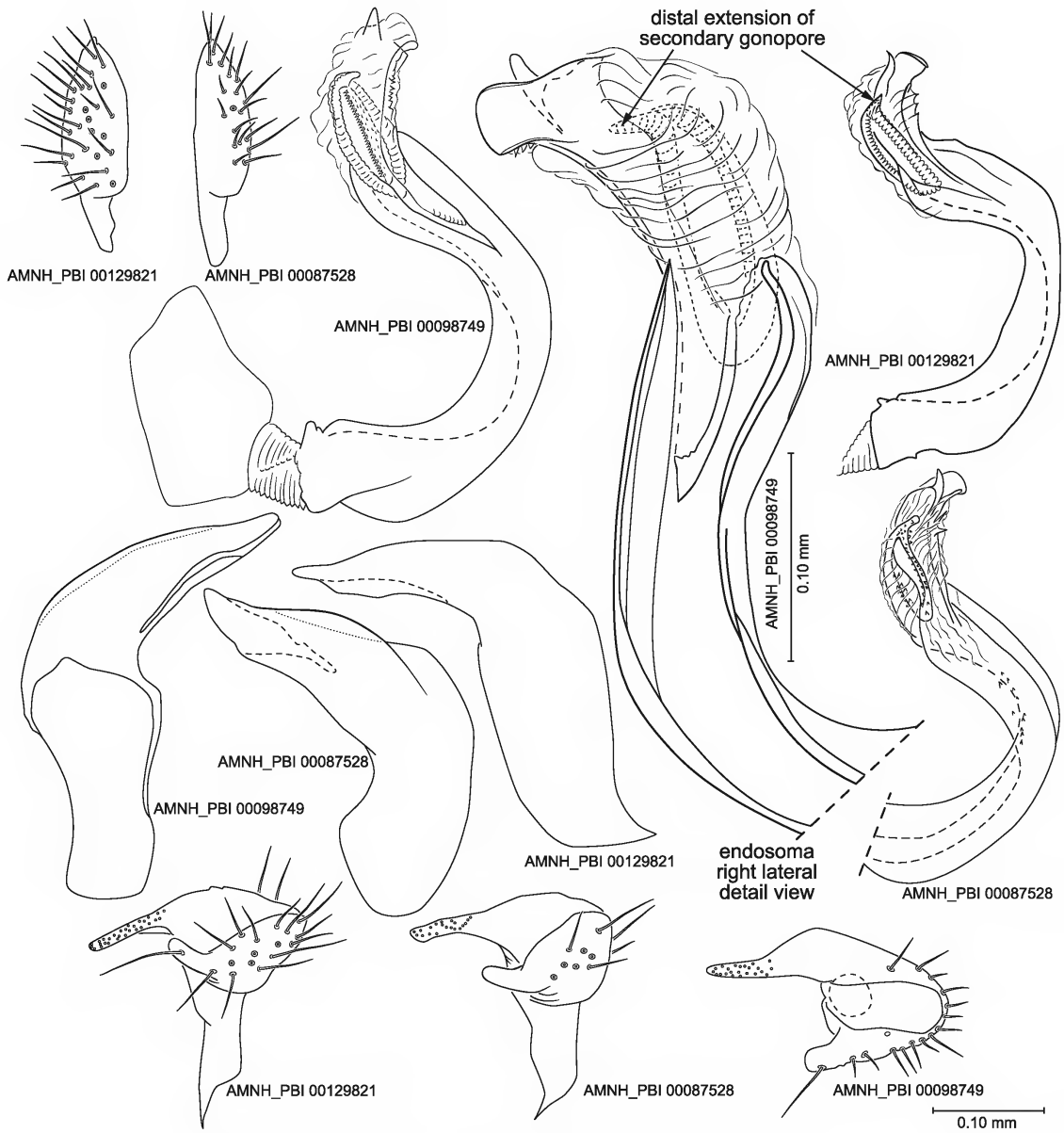


Fig. 72. Male genitalic structures of *Proteophylus grevilleae*.

Etymology: Named for the proteaceous genus *Grevillea*, host of all known specimens of this taxon.

Hosts: Collected on *Grevillea eriostachya* (pl. 35A–C), *G. hookeriana* (pl. 35D), *G. juncifolia* (pl. 35E), and *G.* sp. (Proteaceae); also recorded from *Brachyscome ciliaris* (Asteraceae), which records we attribute to commingling of specimens in the field or during the labeling process.

Distribution (map 19): Known from the Alice Springs area of Central Australia and from the central coast of Western Australia.

Discussion: One of the most frequent hosts of *Proteophylus grevilleae* is *Grevillea eriostchya*, a taxon which produces a tremendous amount of nectar and which leaves your collecting equipment encrusted in sugar. Nonetheless, *P. grevilleae* and a

large undescribed orthotyline never became embedded in the nectar.

HOLOTYPE: **AUSTRALIA: Northern Territory:** jct of Namatjira Drive and Gosse Bluff track, 23.79361°S 132.35888°E, 711 m, 04 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea juncifolia* Hook. subsp. *temulenta* P. Olde & N. Marriott (Proteaceae), det. NSW staff NSW658375, 1♂ (AMNH_PBI 00098743) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 17.5 km E of Stuart Hiway on Horseshoe Bend Rd, 25.16667°S 133.3223°E, 412 m, 29 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea juncifolia* Hook. subsp. *juncifolia* (Proteaceae), det. NSW staff NSW658397, 25♀ (00098512–00098514, 00098518–00098539), 4♂ (00098515–00098517, 00413030) (AMNH). 35.4 km W of Uluru at Kata Tjuta jct on Lasseter Hiway, 25.34361°S 130.68916°E, 592 m, 01 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea eriostachya* Lindl. (Proteaceae), det. NSW staff NSW666278, 5♂ (00389979–00389983), 3♀ (00389984–00389986) (AM), 5♂ (00097973–00097976, 00389723), 4♀ (00097977–00097980) (AMNH). 78 km S of Alice Springs at jct of Rainbow Valley Rd and Stuart Hiway, 24.23334°S 133.4567°E, 540 m, 27 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea juncifolia* Hook. subsp. *juncifolia* (Proteaceae), det. NSW staff NSW658375, 4♂ (00097709–00097711, 00413031), 16♀ (00097712–00097727) (AMNH), 4♀ (00097728–00097730, 00058597) (MNT). 193 km W of Stuart Hiway on Lasseter Hiway, 25.22806°S 131.4775°E, 519 m, 31 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea eriostachya* Lindl. (Proteaceae), det. NSW staff NSW 666269, 3♀ (00097981–00097983) (AM). jct of Namatjira Drive and Gosse Bluff track, 23.79361°S 132.35888°E, 711 m, 04 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea juncifolia* Hook. (Proteaceae), det. NSW staff NSW658375, 16♂ (00098718–00098720, 00098722–00098725, 00098744–00098748, 00098752, 00098749, 00098721, 00413029), 42♀ (00098727–00098742, 00098753–00098774, 00098783, 00098726, 00098789, 00098790) 16♂ (00098718–00098720, 00098722–00098725, 00098744–00098748, 00098752, 00098749, 00098721, 00413029), 42♀ (00098727–00098742, 00098753–00098774, 00098783, 00098726, 00098789, 00098790) (AMNH), 2♀ (00098785, 00098786) (ANIC), 2♀ (00098782, 00098784) (CNC), 2♂ (00098750, 00098751), 5♀ (00098775–00098779) (MNT), 2♀ (00098787, 00098788) (USNM), 2♀ (00098780, 00098781) (ZISP). ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea juncifolia* Hook. subsp. *juncifolia* (Proteaceae), det. NSW staff NSW666263, 1♂ (00098000), 3♀ (00098001–00098003) (AM). **South Australia:** 4 mi. SW of Maynard Bore, Everard Park, 27.35°S 132.348°E, 06 Nov 1970, G.F. Gross, *Grevillea* sp. (Proteaceae), 6♂ (00169082–00169087), 4♀ (00169088–00169091) (SAMA). near Victory Well, Everard Pk. Stn, 27.054°S 132.506°E, 03 Nov 1970, G. Gross, 1♂ (00169081) (SAMA). **Western Australia:** ***Pilbara Co.:*** 25 km ESE of Onslow, 21.82102°S 115.1168°E, 22 m, 29 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Grevillea eriostachya* Lindl. (Proteaceae), det. Perth staff PERTH 7300131, 8♂ (00412752–00412758, 00412764), 9♀ (00412776–00412778, 00412785–00412790) (AMNH), 5♂ (00412759–00412763), 6♀ (00412779–00412784) (WAMP). 2 km E of Nungarin on Rt 50, 31.43596°S 118.2627°E, 330 m, 16 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea hookeriana* Meisn. subsp. *apiciloba* (Proteaceae), det. PERTH staff PERTH 05670195, 1♂ (00087316), 3♀ (00087317, 00390176, 00390177) (AM), 9♂ (00129815–00129818, 00129820, 00129303, 00129304, 00129821, 00413022), 1 nymph (00129822), 9♀ (00129823, 00129306–00129309, 00129311, 00129312, 00129310, 00129825) (AMNH), 1♂ (00129819), 1♀ (00129824) (WAMP). 66.2 km E of North West Coastal Hiway on Mardathuna Rd, 24.45443°S 114.5233°E, 103 m, 01 Nov 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Grevillea eriostachya* Lindl. (Proteaceae), det. PERTH staff PERTH6987117, 1♀ (00390178) (AM). 123 km W of Coolgardie on Great Eastern Hiway, 31.23414°S 120.1562°E, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea hookeriana* Meisn. subsp. *apiciloba* (Proteaceae), det. Perth staff PERTH 05670187, 1♂ (00128981), 2♀ (00128982, 00128983) (AMNH). 135 km W of Coolgardie on Great Eastern Hiway, 31.27202°S 120.0059°E, 489 m, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea hookeriana* Meisn. subsp. *apiciloba* (Proteaceae), det. PERTH staff PERTH 05670187, 1♂ (00087528) (AM). North West Coast Hiway 72 km NE of

jct with Blowholes Rd, 24.18336°S 114.0381°E, 34 m, 28 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Grevillea eriostachya* Lindl. (Proteaceae), det. PERTH staff PERTH6988970, 4♂ (00412792–00412795), 4♀ (00412798, 00412799, 00412801, 00412803) (AM), 1♂ (00412791), 2♀ (00412800, 00412802) (AMNH).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Northern Territory:** 35.4 km W of Uluru at Kata Tjuta jct on Lasseter Hiway, 25.34361°S 130.68916°E, 592 m, 01 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Grevillea eriostachya* Lindl. (Proteaceae), det. NSW staff NSW658299, 1 nymph (00411925) (AMNH). **Western Australia:** ***Pilbara Co.:*** 25 km ESE of Onslow, 21.82102°S 115.1168°E, 22 m, 29 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Grevillea eriostachya* Lindl. (Proteaceae), det. Perth staff PERTH 7300131, 11 nymphs (00412765–00412775) (AMNH). North West Coast Hiway 72 km NE of jct with Blowholes Rd, 24.18336°S 114.0381°E, 34 m, 28 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Grevillea eriostachya* Lindl. (Proteaceae), det. PERTH staff PERTH6988970, 2 nymphs (00412796, 00412797) (AM).

Proteophylus occidentalis, new species
Figure 73, map 19, table 1, plates 24, 25

DIAGNOSIS: Recognized by pale background coloration with castaneous ornament; antennae castaneous, segment 2 terete; pronotal calli wrinkled (pl. 24); endosoma with an elongate, slender, beaklike, apical spine (fig. 73, pl. 25). Most similar to *P. grevilleae* in terete antennal segment 2, but pale background coloration with castaneous antennae, wrinkled pronotal calli, and elongate, slender, apical spine of endosoma distinctive for this species.

DESCRIPTION: *MALE*: Mean total length 2.49, mean pronotum width 0.91. COLORATION (pl. 24): Mottled, castaneous markings on pale background, antennae castaneous; membrane pale with pale veins, small cell mostly castaneous. SURFACE AND VESTITURE (pl. 24): Dorsum granular, dull; vestiture of recumbent simple dark setae and shining lepidote setae. STRUCTURE: Body form robust, not flattened. **Head** (pl. 24): Globular with protuberant globular eyes; frons swollen, clypeus visible in dorsal view; eyes occupying two-thirds height of head in lateral view; antenna inserted barely above ventral margin of eye, eye emarginate above insertion; labium reaching to apex of mesocoxa. *Antenna*: Segment 1 enlarged, segment 2 strongly terete, short (0.52), 0.81 times width of head. **Thorax** (pl. 24): Pronotum with calli wrinkled, somewhat elevated, and distinct, posterior lobe conspicuously elevated, lateral margins weakly concave, posterior margin weakly concave; mesoscutum moderately exposed. *Hemelytron*: Corial margin weakly convex; cuneus short and broad. GENITALIA (fig. 73, pl. 25): **Pygophore:** As in generic description. **Endosoma:** Small; region distad of middle slightly bent to left; ventral strap terminating with several short stout spines proximal to secondary gonopore; dorsal strap strongly narrowed to form long, slender, curving spine distad of secondary gonopore. **Phallotheca:** Dorsal crest short, weakly produced; apex narrowed. **Parameres:** As in generic description, except anterior process of left paramere relatively short, with prominent apical seta; right paramere with prominence on posterior angle.

FEMALE (pl. 24): Coloration and structure as in male; mean total length 3.06, mean pronotum width 1.06.

ETYMOLOGY: From the Latin, *occidentalis*, "western," in reference to its occurrence in Western Australia.

HOSTS: Collected on *Grevillea hookeriana* (pl. 35D), *G. paradoxa*, and *G. wittweri* (pl. 35G) (Proteaceae); also recorded from *Leptospermum erubescens* (Myrtaceae), but this is certainly an error introducing during specimen handling.

DISTRIBUTION (map 19): Known from the Coolgardie region of Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** 123 km W of Coolgardie on Great Eastern Hiway, 31.23414°S 120.1562°E, 17 Nov 1999, R.T. Schuh, G. Cassis and R. Silveira, *Grevillea hookeriana apiciloba* (Proteaceae), det. Perth staff PERTH 05670187, 1♂ (AMNH_PBI 00128984) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 2 km E of Nungarin on Rt 50, 31.43596°S 118.2627°E, 330 m, 16 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea hookeriana apiciloba* (Proteaceae), det. PERTH staff PERTH 05670195, 1♀ (00129305), 1♂ (00129809)

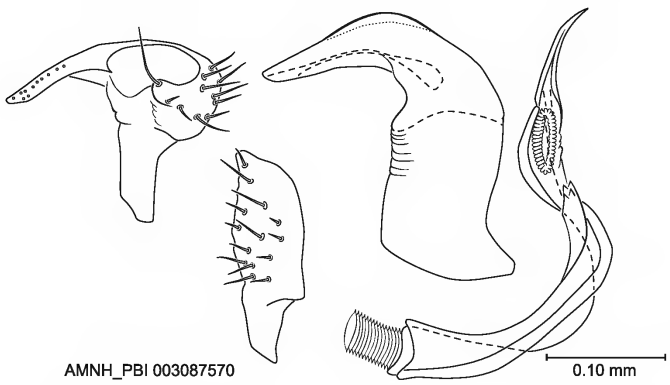


Fig. 73. Male genitalic structures of *Proteophylus occidentalis*.

(AMNH). 15 km E of Merredin, 31.37749°S 118.6933°E, 330 m, 16 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea paradoxa* D. C. (Proteaceae), det. PERTH staff PERTH 05670616, 1♀ (00389987) (AM). 123 km W of Coolgardie on Great Eastern Hiway, 31.23414°S 120.1562°E, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea hookeriana apiciloba* (Proteaceae), det. Perth staff PERTH 05670187, 1♂ (00390179) (AM), 1♀ (00128986) (AMNH), 1♀ (00128985) (WAMP). 135 km W of Coolgardie on Great Eastern Hiway, 31.27202°S 120.0059°E, 489 m, 17 Nov 1999, R.T. Schuh, G. Cassis, and R. Silveira, *Grevillea hookeriana apiciloba* (Proteaceae), det. PERTH staff PERTH 05670187, 1♂ (00413025) (AMNH). Pallarup Nature Reserve, west side, 33.26485°S 119.7565°E, 310 m, 05 Dec 1997, Schuh, Cassis, Brailovsky, Asquith, *Leptospermum erubescens* Schauer (Myrtaceae), det. PERTH staff PERTH 05056373, 2♂ (00087396, 00087570) *Grevillea wittweri* McGill. (Proteaceae), det. PERTH staff PERTH 05099900, 1♀ (00131376) (AM), *Grevillea wittweri* McGill. (Proteaceae), det. PERTH staff PERTH 05099900, 1♂ (00131372), 1♀ (00131375) (AMNH), 1♂ (00131373), 1♀ (00131374) (WAMP).

Proteophylus orientalis, new species
Figure 74, map 19, table 1, plates 24, 25

Diagnosis: Recognized by dirty-yellow coloration, including antennal segments 1 and 2; antennal segment 2 very weakly swollen; calli not distinct from remainder of pronotum (pl. 24); endosoma with two elongate straps merging to form beaklike apical spine (fig. 74, pl. 25). Differing from most *Proteophylus* spp. by dirty-yellow coloration and from others by the weakly swollen antennal segment 2; elongate, slender apical spine of endosoma and form of right paramere with prominent posterior apical angle most similar to *P. occidentalis*.

Description: *Male*: Mean total length 2.94, mean pronotum width 1.05. COLORATION (pl. 24): Dirty yellow (in preserved specimens), including all appendages, with weakly fumose membrane and pale membrane veins. SURFACE AND VESTITURE (pl. 24): Dorsum smooth, weakly shining; vestiture of recumbent, pale, simple setae. STRUCTURE: Body form robust, weakly flattened. **Head** (pl. 24): Weakly globular, moderately protuberant; frons weakly swollen, clypeus partially visible in dorsal view; eyes occupying four-fifths height of head in lateral view; antenna inserted just above ventral margin of eye, eye very weakly emarginate; labium just surpassing apex of mesocoxa. *Antenna*: Segment 1 not enlarged, segment 2 robust and of uniform diameter over length, short (0.60), 0.86 times width of head. **Thorax** (pl. 24): Pronotum with calli weakly elevated, posterior lobe very weakly elevated, lateral margins straight, posterior margin straight; mesoscutum moderately exposed. *Hemelytron*: Corial margin weakly convex; cuneus short and broad. GENITALIA (fig. 74, pl. 25): **Pygophore:** As in generic description. **Endosoma:** Region distad of middle slightly bent to left; ventral strap narrowed to thin weakly sclerotized and faintly serrate band

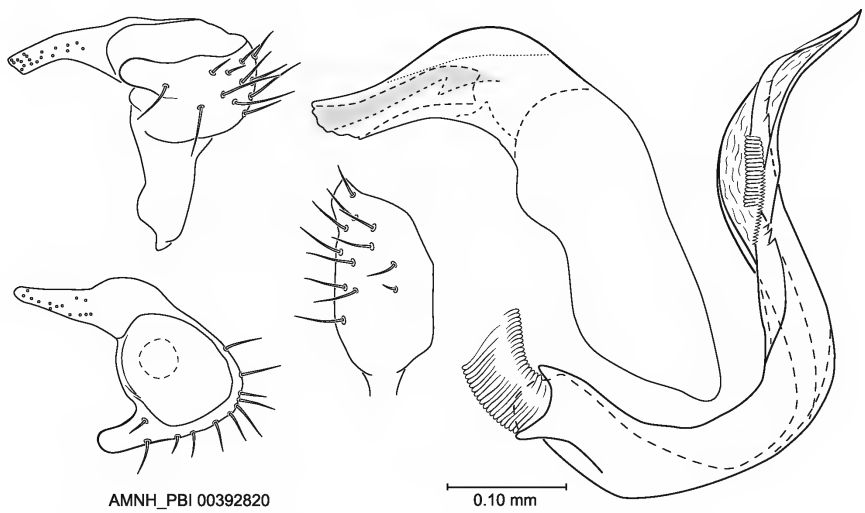


Fig. 74. Male genitalic structures of *Proteophylus orientalis*.

merging with wider, attenuate and pointed apical spine of dorsal strap; lateral surface proximal of secondary gonopore minutely serrate. **Phallotheca:** Apical portion with elongate sclerite on posterior surface; dorsal crest moderately produced, apex rather wide. **Parameres:** As in generic description; right paramere with prominence on posteroapical angle.

Female (pl. 24): Coloration and structure as in male; mean total length 3.33, mean pronotum width 1.24.

Etymology: From the Latin, *orientalis*, "eastern," in reference to its occurrence in southeastern Australia.

Host: Recorded from *Grevillea pterosperma* (pl. 35F) (Proteaceae).

Distribution (map 19): Known only from the type locality, Scorpion Springs Conservation Park, southeastern South Australia.

Holotype: **AUSTRALIA: South Australia:** Scorpion Springs Cons. Park, 35.4493°S 140.874°E, 120 m, 10 Nov 1998, Schuh, Cassis, Silveira, *Grevillea pterosperma* F. Muell. (Proteaceae), det. Royal Bot Gard. NSW NSW427666, 1♂ (AMNH_PBI 00388753) (SAMA).

Paratypes: **AUSTRALIA: South Australia:** Scorpion Springs Cons. Park, 35.4493°S 140.874°E, 120 m, 10 Nov 1998, Schuh, Cassis, Silveira, *Grevillea pterosperma* F. Muell. (Proteaceae), det. Royal Bot Gard. NSW NSW427666, 5♂ (00388752, 00388754, 00388755, 00087417, 00390180), 3♀ (00388762, 00087418, 00390187) (AM), 3♂ (00087578, 00392820, 00390181), 1♀ (00390188) (AMNH), 1♂ (00388751), 2♀ (00390185, 00390186) (SAMA).

Other Specimens Examined: **AUSTRALIA: South Australia:** Scorpion Springs Cons. Park, 35.4493°S 140.874°E, 120 m, 10 Nov 1998, Schuh, Cassis, Silveira, *Grevillea pterosperma* F. Muell. (Proteaceae), det. Royal Bot Gard. NSW NSW427666, 6 nymphs (00388756–00388761), 3 nymphs (00390182–00390184) (AM).

Proteophylus petrophile, new species
Figure 75, map 19, table 1, plates 24, 25, 52B, D, F

Diagnosis: Recognized by pale background coloration with carmine head and mesoscutum (and sometimes scutellum), castaneous posterior lobe of pronotum and linear longitudinal castaneous markings on hemelytron; antenna pale and dark, annulate, segment 2 slender over most of length, modestly swollen distally (pl. 24); endosoma large, apical spine distinctly bent at about midpoint and phallotheca with short ridge on dorsoposterior surface (fig. 75, pl. 25). Most similar to *P. orientalis* in body form, but that species without distinctive carmine and castaneous

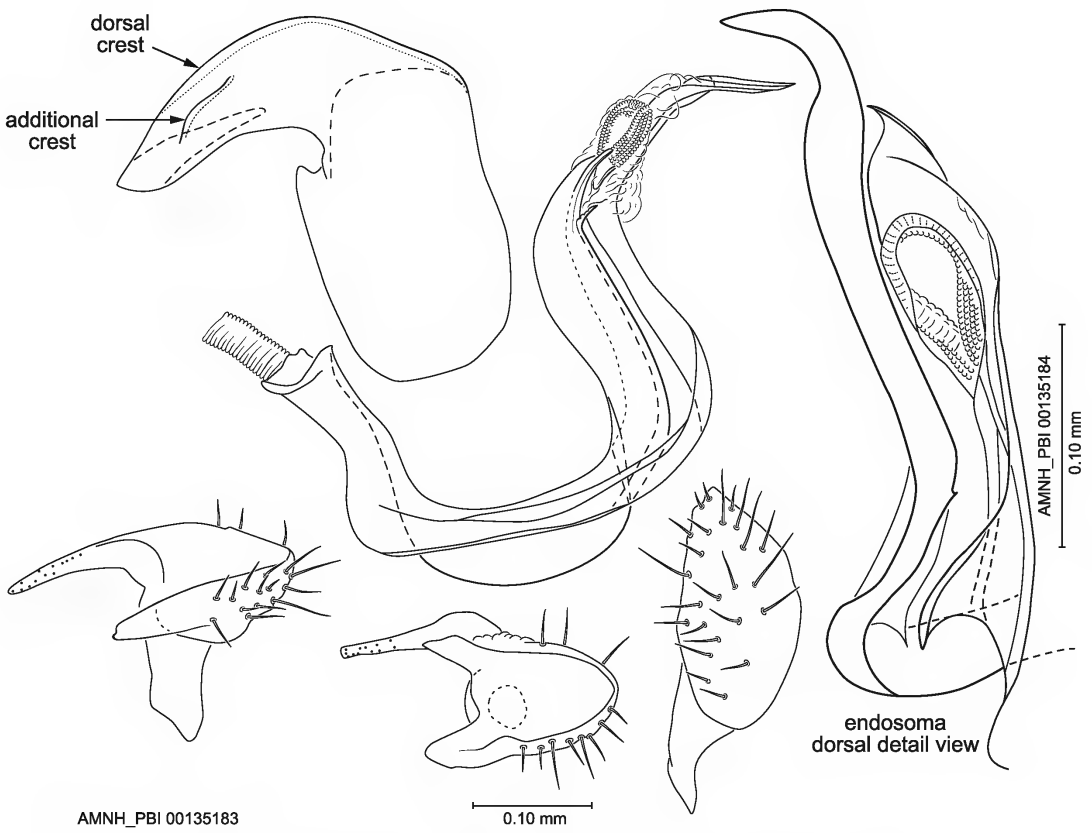


Fig. 75. Male genitalic structures of *Proteophylus petrophile*.

markings and absent strongly bent apical endosomal spine.

DESCRIPTION: *MALE*: Mean total length 2.85, mean pronotum width 0.97. COLORATION (pl. 24): Background coloration pale, including all appendages, head and mesoscutum carmine, posterior lobe of pronotum castaneous, hemelytron with linear castaneous markings; antenna with annular markings, background pale, distal half of segment 1 castaneous, segment 2 dark proximally and apically, segments 3 and 4 mostly dark. SURFACE AND VESTITURE (pl. 24): Dorsum polished, shining, weakly punctured; vestiture of short, recumbent, simple, dark setae. STRUCTURE: Body ovoid, weakly flattened. **Head** (pl. 24): Weakly globular with moderately protuberant eyes; frons swollen, projecting beyond anterior margin of eye, clypeus partially visible in dorsal view; eyes occupying two-thirds height of head in lateral view; antenna inserted at ventral margin of eye, eye very weakly emarginate above insertion; labium reaching to apex of metacoxa. *Antenna*: Segment 1 weakly elongate, not enlarged, segment 2 slender proximally, weakly swollen on distal one-half, short (0.65), 0.93 times width of head. **Thorax** (pl. 24): Pronotum with calli weakly elevated, posterior lobe very weakly elevated, lateral margins concave, humeral angles projecting, posterior margin moderately excavated and concave; mesoscutum broadly exposed. *Hemelytron*: Corial margin convex; cuneus short and broad. GENITALIA (fig. 75, pl. 25): **Pygophore:** As in generic description. **Endosoma:** Large; region distad of middle bent to left, ventral strap terminating in thin sclerite just distad of secondary gonopore, dorsal strap exceeding secondary gonopore, abruptly constricted subapically and with curved, deflected, attenuate apex. **Phallotheca:**

Dorsal crest long and weakly produced, with small additional crest on dorsoposterior surface. **Parameres:** As in generic description.

Female (pl. 24): Coloration and structure as in male; mean total length 3.12, mean pronotum width 1.06. GENITALIA as in plate 52B, D, F.

Etymology: Named for the proteaceous genus *Petrophile*, the only known host of this taxon; a noun in apposition.

Host: Recorded from *Petrophile drummondii* (pl. 36A–C) (Proteaceae).

Distribution (map 19): Known from the west coast of Western Australia north of Perth.

Holotype: **AUSTRALIA: Western Australia:** 11 km S of Eneabba, Eneabba National Park, 29.9025°S 115.24321°E, 150 m, 01 Nov 1996, Schuh and Cassis, *Petrophile drummondii* Meisn. (Proteaceae), det. PERTH staff PERTH 05120071, 1♂ (AMNH_PBI 00135815) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 11 km S of Eneabba, Eneabba National Park, 29.9025°S 115.24321°E, 150 m, 01 Nov 1996, Schuh and Cassis, *Petrophile drummondii* Meisn. (Proteaceae), det. PERTH staff PERTH 05120071, 15♂ (00087174, 00087453, 00390216–00390228), 12♀ (00087175, 00390230–00390240) (AM), 35♂ (00135175–00135182, 00135185–00135193, 00128525–00128528, 00135816–00135826, 00135837, 00135183, 00135184), 42♀ (00135194–00135200, 00135207, 00135211, 00135212, 00135216, 00128529–00128531, 00135838–00135847, 00135851–00135866, 00135213, 00135214) (AMNH), 2♀ (00135205, 00135206), 1♂ (00135828) (ANIC), 2♀ (00135203, 00135204), 1♂ (00135829) (CNC), 2♀ (00135208, 00135209), 1♂ (00135827) (USNM), 13♀ (00135210, 00135215, 00135217–00135224, 00135848–00135850), 6♂ (00135831–00135836) (WAMP), 2♀ (00135201, 00135202), 1♂ (00135830) (ZISP). 11 km S of Eneabba on Brand Hiway, Eneabba Reserve, 29.91094°S 115.1175°E, 100 m, 21 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Petrophile drummondii* Meisn. (Proteaceae), det. PERTH staff PERTH6986862, 3♂ (00390203, 00390204, 00390215), 5♀ (00390210–00390214) (AM).

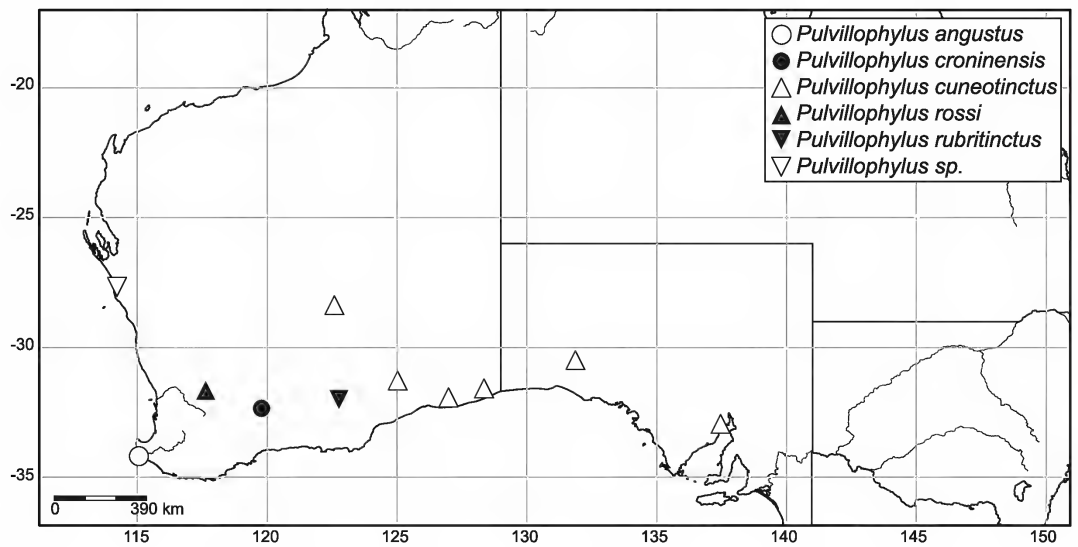
Other Specimens Examined: **AUSTRALIA: Western Australia:** 11 km S of Eneabba, Eneabba National Park, 29.9025°S 115.24321°E, 150 m, 01 Nov 1996, Schuh and Cassis, *Petrophile drummondii* Meisn. (Proteaceae), det. PERTH staff PERTH 05120071, 1 nymph (00390241) (AM). 11 km S of Eneabba on Brand Hiway, Eneabba Reserve, 29.91094°S 115.1175°E, 100 m, 21 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Petrophile drummondii* Meisn. (Proteaceae), det. PERTH staff PERTH6986862, 5 nymphs (00390205–00390209) (AM).

Pulvillophylus, new genus

Type Species: Pulvillophylus cuneotinctus, new species.

Diagnosis: Recognized by moderately to very strongly projecting face, relatively large size of most known taxa, and frequent occurrence of erect, black, spinelike setae on anterior lobe of pronotum; coloration variable, ranging from almost completely dark to largely pale with some red markings (pl. 26); endosoma relatively short and stout, weakly sigmoid to C-shaped, with apical spine originating from ventral strap, either bifid or hooked (pl. 27). Most easily confused with *Halophylus*, both in similarity of appearance of some species, in structure of endosoma, particularly superficial form of apical spines, and females with medially prominent subgenital plate, but *Pulvillophylus* with single apical spine derived from ventral strap, secondary gonopore large and dorsally placed, face usually much longer, and rarely with woolly sericeous setae of type seen in *Halophylus* and *Lepidophylus*; *Halophylus* with two apical endosomal spines (pl. 17), one derived from each endosomal strap. Secondary gonopore of *Proteophylus grevilleae* similar in placement and size to *Pulvillophylus* spp., but in *P. grevilleae* apical rim of secondary gonopore with small extension (fig. 72, pl. 25) and antennal segment 2 terete (pl. 24). Dorsum in *Lepidophylus* uniformly covered with lepidote setae and small, dark spots.

Description: *Male*: Total length 3.29–6.35, pronotum width 0.97–1.67. COLORATION (pl. 26): Overall coloration from mostly pale with reddish markings, including appendages, to mostly brown; coloration of antennae and legs similar to coloration of dorsum. SURFACE AND VESTITURE (pl. 26): Body surface with reclining common setae; pronotum frequently with some erect spinelike setae. STRUCTURE (pl. 26): Body form



Map 20. Distribution of *Pulvillophylus* spp.

ranging from ovoid to greatly elongate and nearly parallel sided. **Head:** Head ranging from relatively broad with frons projecting beyond eye about length of eye to greatly elongate, flattened dorsoventrally, and clypeus exceeding eye by at least 2.5 times length of eye; eye sometimes semicircular and situated laterally on head and not overlapping pronotum, or eyes more nearly reniform with posterior margin in broader contact with anterior margin of pronotum. *Antenna*: Segment 1 weakly to greatly elongate, often exceeding clypeus by half the length of segment, segment 2 long, more or less parallel sided, segments 3 and 4 more slender than preceding two segments. **Thorax:** Pronotum weakly to distinctly campanulate, posterior lobe nearly flat to weakly elevated, posterior margin straight. *Hemelytron*: Costal margin sometimes weakly convex and body form elongate ovoid, or costal margin more nearly straight and species more almost parallel sided. GENITALIA (figs. 76–80, pl. 27): **Pygophore:** Conical; posterior surface somewhat truncate; without surface tubercles or clumps of bristles. **Endosoma:** Relatively short and stout, sigmoid or C-shaped; ventral strap forming region distad of secondary gonopore, bent to left, of variable length and usually twisted and with one apical spine, usually hooklike or bifid; rarely with subapical field of spicules on ventral surface distad of secondary gonopore; dorsal strap terminating proximad of, and forming notch around, base of secondary gonopore; secondary gonopore occupying dorsal margin, subapical, well sclerotized, relatively large and open. **Phallotheca:** Apical portion broadly conical with distal one-half variously attenuate or short and relatively stout; dorsal surface without crest, sometimes dorsal edge of aperture raised; aperture situated on anterior or anteroventral surface, margins variable, usually long and narrow, sometimes large, ovoid; basal portion short, reaching equal to anterior margin of pygophore in situ. **Parameres:** Left paramere typically phyline, posterior margin swollen medially in dorsal and lateral view, length moderate, apically straight or slightly deflected; anterior process short, usually narrowed apically; prominent seta on apex or on apicolateral surface of process. Right paramere of moderate size, broadly fusiform, with small, pointed, medially situated terminal spine.

Female: Where known coloration and structure similar to male; total length 3.74–6.43, pronotum width 1.01–1.31. GENITALIA (pl. 53): **Subgenital plate of sternite 6:** With posteriorly directed medial projection. **Vestibular sclerites:** Medium size, not attaining anterior edge of dorsal labiate plate. *First*

gonapophyses: Relatively small basal blocks. *Ventral labiate plate*: Platelike medial anteroventral extension short, tilted to left side, covering anterior surface of basal structures. **Dorsal labiate plate:** Medium size, short longitudinally. *Sclerotized rings*: Large, subovoid, relatively flat, very thick walled; dorsal labiate plate ventrad of rings strongly spiculate. *Posteromedial region*: Surface without conspicuous microstructure. *Anterolateral region*: Anterior margin extending slightly beyond anterior edge of sclerotized rings. **Posterior wall:** *Intersegmental structure*: Narrow, bilobed, tuberclelike, apically pointed; transverse outpocket projecting anteriorly from ventral surface of connecting membrane. *Interramal sclerites*: Strongly sclerotized, lateral sclerites widest laterad, narrow medially with jagged margins, medial sclerite bell shaped.

ETYMOLOGY: From the Latin *pulvillus*, "small cushion or pillow," in reference to the distinctive nature of the pretarsal structures, and the generic name *Phylus*; masculine.

DISCUSSION: The C-shaped contour of the endosoma in *Pulvillophylus* spp. is apparent in lateral view, but in dorsal view the short region distad of the secondary gonopore is clearly bent to the left, revealing the sigmoid conformation of the endosoma in most species we place in this genus.

Although we have no confirmed host associations for any of the species we place in *Pulvillophylus*, we have examined a single female specimen collected on *Calytrix brevifolia* (Myrtaceae) (pl. 34C) in the Kalbarri National Park (plate 26; AMNH_PBI 00090783) that shares features of coloration, head shape, and body form reminiscent of *P. angustus*. Even though the genitalic morphology of the group is most similar to that seen in the halophyte-feeding genus *Halophylus*, this single female suggests a possible association with the Myrtaceae. The reddish coloration of this species as well as *P. cuneotinctus* and *P. rubritinctus* suggest an association with plant taxa with red flowers, whereas the somber coloration of *P. croninensis* and *P. rossi*, as also seen in *Halophylus tecticornii*, suggests a more likely association with chenopods such as *Tecticornia*. Only through further collecting will the answer to this question become apparent.

Pulvillophylus angustus, new species
Figure 76, map 20, table 1, plates 26, 27

DIAGNOSIS: Recognized by relatively small size, compact ovoid body, strongly projecting clypeus and swollen frons, in combination with pale and red coloration (pl. 26); femora with spots on distal half unlike all other *Pulvillophylus* spp.; endosoma very stout and deep, region distad of secondary gonopore short, dominated by long, hooklike spine (fig. 76, pl. 27). Distinguished from congeners by its compact body form, largely reddish coloration, form of head, and distinct shape of hook on apical endosomal spine. Spots on femora and scattered, woolly, sericeous setae on head, thorax, scutellum, and anteriormost portion of clavus also seen in *Halophylus*.

DESCRIPTION: *MALE*: Ovoid; total length 3.85, pronotum width 1.02. COLORATION (pl. 26): Background pale, including appendages, with reddish spots and markings; antennal segment 2 and femora heavily reddish, remaining antennal segments and tibiae pale. SURFACE AND VESTITURE (pl. 26): Body surface with reclining, dark, common setae, pronotum with some erect spinelike setae on anterior process, and head, pronotum, scutellum, and anteriormost portion of clavus also with scattered, weakly flattened, woolly, sericeous setae. STRUCTURE (pl. 26): Body elongate ovoid. **Head:** Head prognathous, frons swollen, projecting beyond eye by about 1.5 times length of eye, clypeus projecting and visible from above; eyes semicircular and situated laterally on head as viewed from above; eye occupying two-thirds height of head in lateral view; antenna inserted level with ventral margin of eye; labium surpassing apex of metacoxa and reaching onto abdomen. *Antenna*: Segment 1 strongly elongate, exceeding apex of head by half length of segment, segment 2 moderately long (1.25), 1.84 times width of head. **Thorax:** Pronotum distinctly campanulate, posterior lobe weakly elevated, posterior margin straight, mesoscutum broadly exposed. *Hemelytron*: Costal margin convex, body elongate ovoid. GENITALIA (fig. 76, pl. 27): **Pygophore:** As in generic description. **Endosoma:** C-shaped, short, stout; ventral strap wide in lateral view, posteroventral margin, opposite of secondary gonopore, broken by cleft;

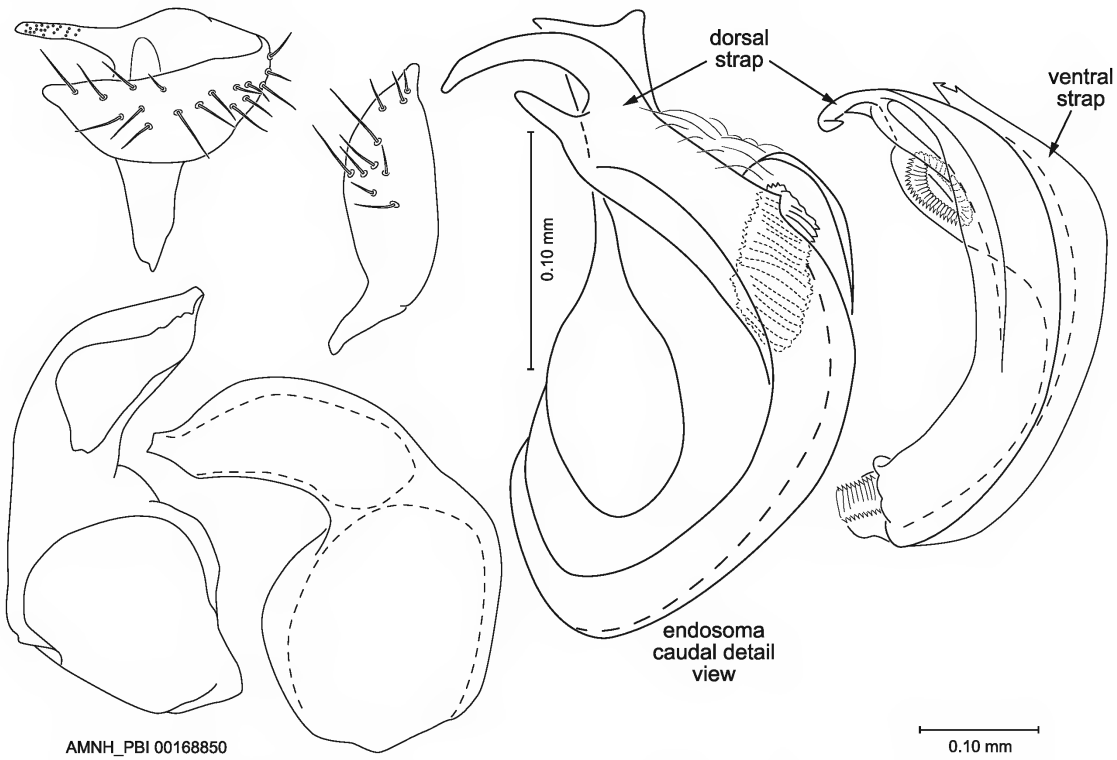


Fig. 76. Male genitalic structures of *Pulvillophylus angustus*.

apical portion of dorsal strap subequal to length of secondary gonopore, bifid with a short, straight spine and a long, curved apical spine. **Phallotheca:** Short, stout; with large ovoid aperture on anterior surface. **Parameres:** As in generic description.

Female: Unknown.

Etymology: From the Latin, *angustus*, "narrow," in reference to the elongate, slender head.

Host: Unknown.

Distribution (map 20): Known only from the type locality, near Margaret River, far southwestern Western Australia.

Discussion: We have examined a series of specimens from Hat Head National Park near Kempsey, New South Wales, which are strikingly similar in appearance and coloration to *Pulvillophylus angustus*. These similarities include the elongate-oval body, the strongly prognathous head, the presence of erect black spines as well as woolly sericeous setae on the head, pronotum, and scutellum, and the long labium reaching to the anterior margin of the pygophore. The host labels indicate the specimens were collected on *Leptospermum* (Myrtaceae), whereas there are no definitive host data for any of the species we place in *Pulvillophylus*. Although the overall appearance might seem a compelling reason to treat this taxon as a *Pulvillophylus* species, several attributes militate against such a decision. First, the claws, rather than being long, slender, and nearly straight, are only moderately long and strongly bent near the apex. The pulvilli are enlarged, but reach only about two-thirds the length of the claw and appear to be adnate to the claw over most of their length. The endosoma is completely unlike that seen in *Pulvillophylus*, being much more similar in form to that of *Maculiphylus eremophilae* (fig. 53, pl. 25), although all remaining aspects of morphology bear no similarity with that taxon. Thus, we conclude that the Hat Head specimens are not members of the Cremnorrhinina and that their similarities with *Proteophylus angustus* are the result of convergence.

Holotype: **AUSTRALIA: Western Australia:** 1 mi E of Jewel Cave, Augusta, 34.26667°S

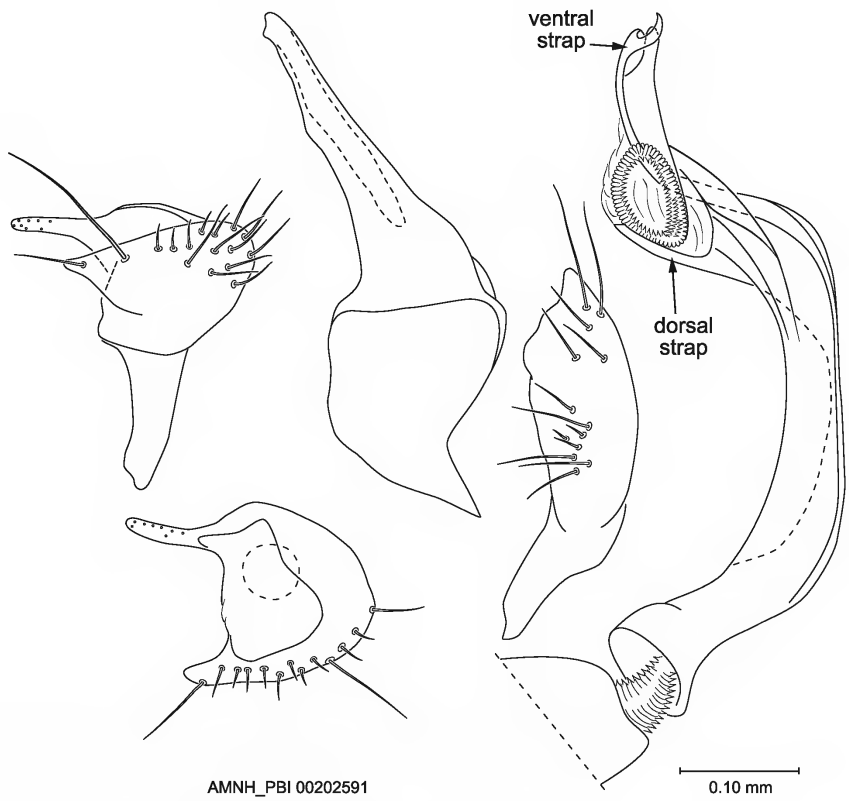


Fig. 77. Male genitalic structures of *Pulvillophylus croninensis*.

115.1°E, 22 m, 03 Oct 1970, D.H. Colless, 1♂ (AMNH_PBI 00168850) (ANIC).

Pulvillophylus croninensis, new species
Figure 77, map 20, table 1, plates 26, 27

Diagnosis: Recognized by the large size, dark dirty-red to brown coloration, including antennal segments 1 and 2, and dorsoventrally flattened, strongly prognathous head (pl. 26); endosoma sigmoid, apical region long with equal length terminal spines one short and stout, the other longer and hooked (fig. 77, pl. 27). Structure and color of female similar to male (pl. 26). Easily recognized by large size, elongate body, dark coloration, and prognathous head, as well as distinctive size and location of hook on apical endosomal spine. Elongate head most similar to *P. angustus*, but that species much smaller, with pale and red coloration.

Description: *Male*: Total length 6.05, pronotum width 1.26. COLORATION (pl. 26): General coloration dirty red to brown, including appendages, with reddish spots and markings; midline of pronotum with a pale stripe; antenna brown, membrane strongly fumose with dark red veins; femora reddish brown, tibiae weakly brown. SURFACE AND VESTITURE (pl. 26): Body surface with reclining, dark, common setae, pronotum with some erect spinelike setae on anterior lobe, and head, pronotum, scutellum, and anteriormost portion of clavus also with scattered, weakly flattened, woolly, sericeous setae. STRUCTURE (pl. 26): Body elongate ovoid. **Head:** Head very strongly prognathous, flattened dorsoventrally, projecting beyond eye by about 2.5 times length of eye, clypeus projecting and visible in entirety from above; eyes semicircular and situated laterally on head; eye occupying four-fifths height of head in lateral view; antenna inserted just above ventral margin of eye; labium reaching pygophore. *Antenna*: Segment 1 strongly elongate, exceeding apex of head by one-third length of

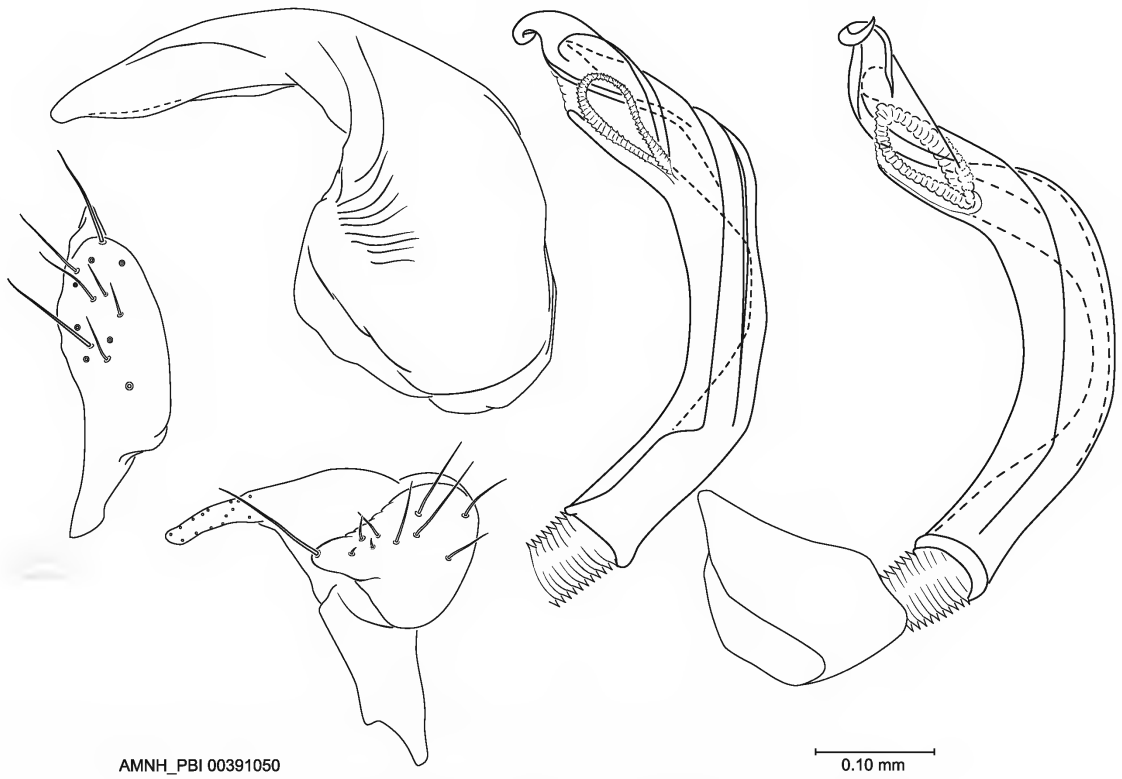


Fig. 78. Male genitalic structures of *Pulvillophylus cuneotinctus*.

segment, segment 2 long, somewhat thickened, of uniform diameter over length (1.65), 2.10 times width of head. **Thorax:** Pronotum with calli wrinkled, lateral margins nearly straight, posterior lobe flat, posterior margin weakly excavated, mesoscutum broadly exposed. *Hemelytron*: Costal margin weakly convex, body very elongate ovoid. GENITALIA (fig. 77, pl. 27): **Pygophore:** As in generic description. **Endosoma:** Sigmoid; ventral strap with distal length one-half again as long as secondary gonopore; terminally bifid with very short, stout spine and slightly longer, sharp, hooked spine. **Phallotheca:** Apical portion long, narrow with long narrow aperture situated on ventral edge of posterior surface. **Parameres:** As in generic description.

Female (pl. 26): Coloration and structure as in male, except antennal segment 2 pale on basal half and tapering proximally; total length 6.43, pronotum width 1.31.

Etymology: Named for Lake Cronin, Western Australia, near the type locality.

Host: Unknown.

Distribution (map 20): Known only from the type locality, north of Lake King, southwestern Western Australia.

Discussion: This species strongly resembles certain taxa in the subfamily Cylapinae, based on the somber coloration, the strongly prognathous head, and the long appendages.

Holotype: **AUSTRALIA: Western Australia:** 7.5 km WSW of Lake Cronin, 32.38333°S 119.8°E, 387 m, 19 Sep 1978–26 Sep 1978, T.F. Houston et al, 1♂ (AMNH_PBI 00202591) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 7.5 km WSW of Lake Cronin, 32.38333°S 119.8°E, 387 m, 19 Sep 1978–26 Sep 1978, T.F. Houston et al, 1♀ (00202592) (WAMP).

Pulvillophylus cuneotinctus, new species
Figure 78, map 20, table 1, plates 26, 27

Diagnosis: Recognized by the large size, moderately projecting face, yellowish pronotum, corium, clavus, tibiae and membrane veins, and weakly reddish head, scutellum,

cuneus, antennae, and femora (pl. 26); endosoma sigmoid, ventral strap forming a relatively short, strongly curving, hooked apical spine (fig. 78, pl. 27). Most similar in size, form of head, and coloration, to *P. rubritinctus*; distinguished by clavus and corium strongly reddish in that species as well as by easily observed differences in form of hook on apical endosomal spine. Overall appearance of this taxon, including size, similar to some colorful species of mirine genus *Phytocoris* Hahn.

DESCRIPTION: *MALE*: Mean total length 6.08, mean pronotum width 1.52. COLORATION (pl. 26): Background yellow green (in preserved specimens); head, mesoscutum, scutellum, cuneus, antennal segment 1, and femora heavily reddish, remaining antennal segments and tibiae pale. SURFACE AND VESTITURE (pl. 26): Body surface smooth, dull to very weakly shining, with reclining, dark, common setae. STRUCTURE (pl. 26): Body elongate, nearly parallel sided. **Head:** Frons swollen, projecting beyond eye by about length of eye, clypeus visible above; eye quadrate and bulging in dorsal view, occupying four-fifths height of head in lateral view; antenna inserted at just above ventral margin of eye, eye emarginate at and above insertion; labium reaching to about midpoint of pregenital abdominal segments. *Antenna*: Segment 1 elongate, exceeding apex of head by one-third length of segment, segment 2 long (1.88), 1.76 times width of head. **Thorax:** Pronotum weakly campanulate, lateral margins sinuous, posterior lobe weakly elevated, posterior margin straight; mesoscutum broadly exposed. *Hemelytron*: Costal margin very weakly convex, body elongate nearly parallel sided. GENITALIA (fig. 78, pl. 27): **Pygophore:** As in generic description. **Endosoma:** Sigmoid; ventral strap short, forming sharply hooked spine equal to length of secondary gonopore; dorsal strap terminating near distal edge of secondary gonopore. **Phallotheca:** Long, relatively narrow; aperture on anterior surface, long, with equal moderate width throughout; surface of basal portion strongly ribbed. **Parameres:** As in generic description.

FEMALE: Unknown.

ETYMOLOGY: From the Latin, *tinctus*, "dyed or painted," and *cuneus*, in reference to the contrastingly colored cuneus.

HOST: Unknown.

DISTRIBUTION (map 20): Known from localities in New South Wales, South Australia and Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia:** Madura, 31.928°S 126.978°E, 07 Oct 1968, Key, Upton and Balderson, 1♂ (AMNH_PBI 00168848) (ANIC).

PARATYPES: **AUSTRALIA: New South Wales:** Trangie, 32.03333°S 147.98333°E, 26 Oct 1951, B. Cameron, 1♂ (00168851) (AM). **South Australia:** 1 mi ESE of Ooldea, 30.463°S 131.852°E, 03 Oct 1968, Key, Upton & Balderson, 1♂ (00168847) (AM), 3♂ (00168843, 00168844, 00168846) (AMNH), 3♂ (00168841, 00168842, 00168845) (ANIC); 03 Oct 1968, Key, Upton & Balderson, 1♂ (00391050) (AM). Middleback Str. via Whyalla, 32.96667°S 137.45°E, 66 m, 16 Oct 1986, S. Barker, 1♂ (00169075) (SAMA). **Western Australia:** 19 mi N by E of Mundrabilla HS, 31.56667°S 128.36667°E, 107 m, 16 Oct 1968, Britton, Upton, and Balderson, 2♂ (00168830, 00168831) (ANIC). 24 mi. SW of Rawlinna, 31.257°S 125.031°E, 09 Oct 1968, Key, Upton and Balderson, 1♂ (00168840), 1♂ (00391093) (AM), 1♂ (00168839) (AMNH), 7♂ (00168832–00168838) (ANIC). 37 km NE of Laverton, 28.35°S 122.61666°E, 10 Sep 1982–12 Sep 1982, B. Hanich & T.F. Houston, 1♂ (00202590) (WAMP). Madura, 31.928°S 126.978°E, 07 Oct 1968, Key, Upton and Balderson, 1♂ (00168849) (ANIC).

Pulvillophylus rossi, new species

Figure 79, map 20, table 1, plates 26, 27, 53

DIAGNOSIS: Recognized by relatively small size, compact body form, moderately projecting head, and mostly brown coloration, including all appendages (pl. 26); endosoma short, stout, almost straight, secondary gonopore large relative to total size of endosoma, apical spine small, hooked, and ventral surface with field of spicules distad of secondary gonopore (fig. 79, pl. 27). Easily confused with *Halophylus tecticornii* (pl. 16) on basis of size and dark coloration of dorsum and appendages, but femora without spots on distal half, and with hooked apical spine

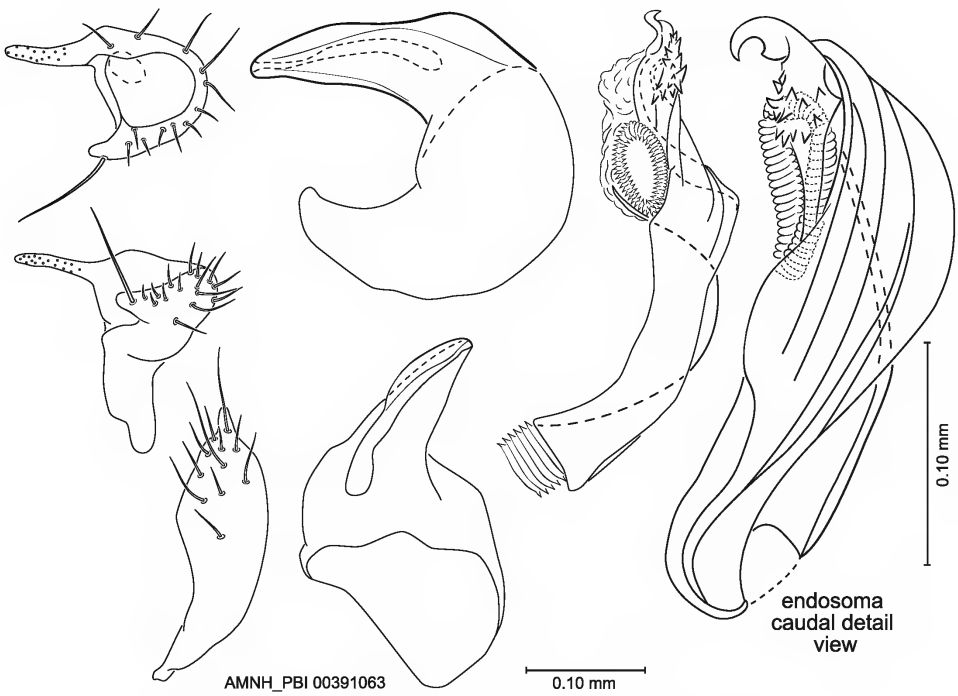


Fig. 79. Male genitalic structures of *Pulvillophylus rossi*.

and subapical spicules unlike those of *Halophylus* spp.

DESCRIPTION: *MALE*: Mean total length 3.46, mean pronotum width 1.02. COLORATION (pl. 26): Overall coloration mostly dark brown; exocorium pale, membrane fumose; antenna and femora dark; tibiae pale, spines without dark bases. SURFACE AND VESTITURE (pl. 26): Body surface smooth and weakly shining, mostly dull, with reclining, dark common setae (available specimens all badly rubbed). STRUCTURE (pl. 26): Body weakly elongate, rectangular. **Head:** Short and broad, eyes bulging; frons swollen, less strongly prognathous than most other *Pulvillophylus* spp., projecting beyond anterior margin of eye by about diameter of eye, clypeus partially visible from above; eye occupying about three-fifths height of head in lateral view; antenna inserted at ventral margin of eye, eye not emarginate at insertion; labium reaching to apex of metacoxa. *Antenna*: Segment 1 elongate, exceeding apex of head by one-third length of segment, segment 2 moderately long (0.98), 1.15 times width of head. **Thorax:** Pronotum with calli distinct, lateral margins nearly straight, posterior margin straight, mesoscutum narrowly exposed. *Hemelytron*: Costal margin nearly straight. GENITALIA (fig. 79, pl. 27): **Pygophore:** As in generic description. **Endosoma:** Sigmoid; ventral strap with distal length subequal to length of secondary gonopore; terminally with one hooked, sharp, apical spine subtended by field of prominent spicules. **Phallotheca:** Wide relative to length, anterior aspect with undulating dorsal margin and short gentle ridge dorsad of aperture; basal portion narrowed proximally and strongly curving. **Parameres:** As in generic description.

FEMALE (pl. 26): Structure and coloration similar to male, body somewhat more ovoid, antennal segment 2 weakly tapering proximally; mean total length 3.84, mean pronotum width 1.09. GENITALIA as in plate 53.

ETYMOLOGY: Named after E.S. Ross, longtime curator of insects at the California Academy of Sciences, in recognition of his having collected all known specimens of this species.

HOST: Unknown.

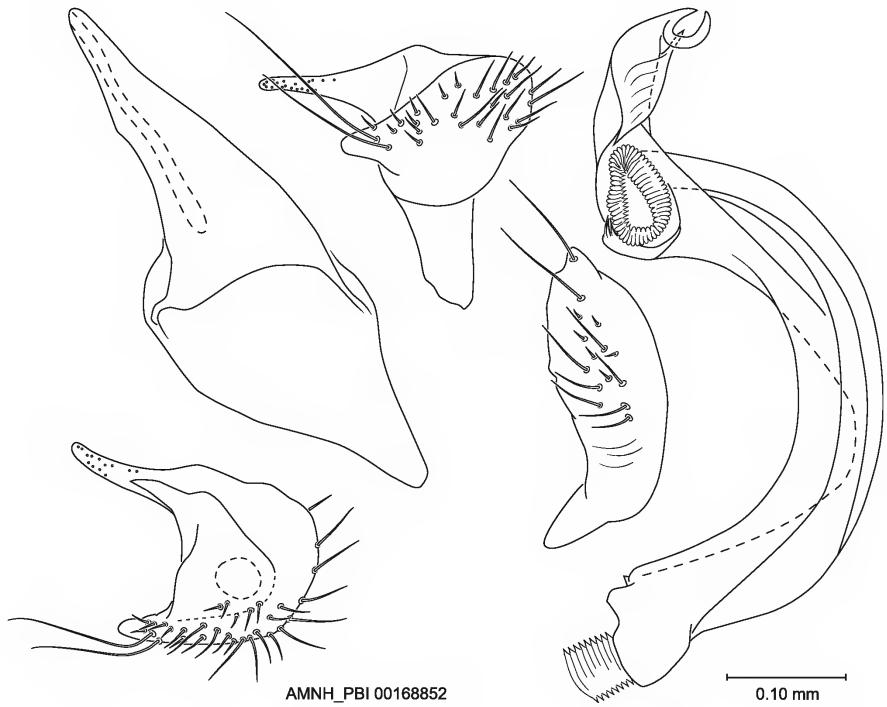


Fig. 80. Male genitalic structures of *Pulvillophylus rubritinctus*.

DISTRIBUTION (map 20): Known only from the type locality, Kellerberrin, Western Australia, east of Perth.

HOLOTYPE: **AUSTRALIA: Western Australia:** 5 mi W of Kellerberrin, 31.62314°S 117.64027°E, 325 m, 15 Sep 1962, E.S. Ross & D.Q. Cavagnaro, 1♂ (AMNH_PBI 00078722) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 5 mi W of Kellerberrin, 31.62314°S 117.64027°E, 325 m, 15 Sep 1962, E.S. Ross & D.Q. Cavagnaro, 3♂ (00078737–00078739), 2♀ (00292458, 00292459), 2♀ (00391065, 00391066) (AM), 4♂ (00078699, 00078700, 00078710, 00078721), 5♀ (00078740, 00078741, 00078763, 00078765, 00078766), 2♂ (00391063, 00391064) (AMNH), 30♂ (00078701–00078709, 00078711–00078720, 00078723–00078733), 23♀ (00078742–00078761, 00078764, 00078767, 00292460) (CAS), 3♂ (00078734–00078736), 2♀ (00078762, 00292461) (WAMP).

Pulvillophylus rubritinctus, new species
Figure 80, map 20, table 1, plates 26, 27

DIAGNOSIS: Recognized by large size, moderately projecting face, largely red dorsum, including membrane veins, with intermixed pale areas, particularly along claval suture and base of cuneus; distal half of femora reddish, antennal segments 1 and 2 heavily infuscate (pl. 26); endosoma sigmoid, apical region longer than secondary gonopore with two relatively long terminal spines, one tubercle-like the other small and strongly hooked (fig. 80, pl. 27). Most similar in size, form of head, and coloration, to *P. cuneotinctus*; distinguished by clavus and corium being yellow/green in that species, rather than red as in *P. rubritinctus*, and by easily observed differences in form of hook on apical endosomal spine.

DESCRIPTION: *MALE*: Total length 5.40, pronotum width 1.48. COLORATION (pl. 26): Background coloration red; head, mesoscutum, scutellum, clavus, endocorium less strongly so, cuneus, and membrane veins red; claval suture contrastingly pale along entire length; antennal segment 1 castaneous, remaining segments infuscate; femora heavily reddish, tibiae pale. SURFACE AND VESTITURE (pl. 26): Body surface smooth, dull to very weakly shining, with reclining, dark,

common setae, pronotum with some erect spinelike setae. STRUCTURE (pl. 26): Body elongate, nearly parallel sided. **Head:** Frons moderately swollen, projecting beyond eye by about length of eye, clypeus visible from above; eyes angulate along lateral margin; eye occupying four-fifths height of head; antenna inserted just above ventral margin of eye; labium reaching to pygophore. *Antenna*: Segment 1 elongate, exceeding apex of head by one-third length of segment, segment 2 long (1.73), 2.01 times width of head. **Thorax:** Pronotum weakly campanulate, lateral margin sinuous, posterior lobe weakly elevated, posterior margin excavated; mesoscutum broadly exposed. *Hemelytron*: Costal margin straight, body elongate nearly parallel sided. GENITALIA (fig. 80, pl. 27): **Pygophore:** As in generic description. **Endosoma:** Sigmoid; dorsal strap terminating at about midpoint of secondary gonopore, ventral strap exceeding secondary gonopore by slightly more than length of gonopore, terminally bifid, forming a tuberclelike stout spine and a small, short, apically sharp, hooked spine. **Phallotheca:** Apical portion long, narrow with long, relatively narrow aperture situated on ventral edge of anterior surface and conspicuously open on dorsoapical edge. **Parameres:** As in generic description.

Female: Unknown.

Etymology: From the Latin, *ruber*, "red," and *tinctus*, "dyed or painted," in reference to the conspicuous red markings on this taxon.

Host: Unknown.

Distribution (map 20): Known only from the type locality east of Norseman, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** 61 mi E of Norseman, 32.03°S 122.77°E, 29 Apr 1968, I.F.B. Common & M.S. Upton, 1♂ (AMNH_PBI 00168852) (ANIC).

Spinivesica, new genus

Type Species: *Spinivesica eremophiloides*, new species.

Diagnosis: Recognized by the elongate ovoid body in both sexes, head and vertex relatively broad, usually greenish or pale coloration, and hemelytron sometimes with a contrasting dark spot on inner angle of cuneus or at apex of membrane cells (pl. 28); endosoma predominately sigmoid, with a prominent lateral spine, usually proximal to secondary gonopore, and with a flat apical sclerite of variable configuration beset with numerous microtrichia and usually associated with billowy membrane (figs. 82–91, pl. 29); phallotheca usually with strongly sclerotized ridge on dorsoposterior surface. Most easily confused with species of *Dicyphylus*, *Myrtophylus*, and *Telophylus* based on lateral endosomal spine, but *Spinivesica* never with fields of spicules on phallotheca as in *Dicyphylus* (pl. 7), lacking bifid apex of endosoma as seen in *Myrtophylus* (pl. 21), and without medially placed secondary gonopore and apically directed lateral spine as in *Telophylus* (pl. 31). Potentially confused with *Gyrophallus* (pls. 13, 15) because of membranous, terminal, endosomal "bag," but that structure covered with spicules (microtrichia) in *Spinivesica* and ornamented with denticles in *Gyrophallus*; endosomal bag absent in *Dicyphylus* and *Myrtophylus*.

Description: *Male*: Total length 2.23–3.91, pronotum width 0.82–1.06. COLORATION (pl. 28): Pale, yellowish, or green, including all appendages, rarely general coloration infuscate; corium translucent, frequently with infuscate mark adjacent to inner angle of cuneus; membrane pale to weakly infuscate, very rarely fumose, sometimes with a dark marking at apex of cells. SURFACE AND VESTITURE (fig. 81C, D, pl. 28): Dorsum smooth, polished and weakly shining. Dorsum clothed with recumbent pale or dark simple setae, sometimes with flattened appressed black setae. STRUCTURE: **Head** (fig. 81A, B, pl. 28): Short, transverse, conforming to anterior margin of pronotum; frons at most weakly surpassing anterior margin of eyes; eyes moderately large, weakly bulging; antennal segment 2 relatively short, weakly tapered proximally. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight to weakly convex, anterior lobe short, calli weakly demarcated along posterior margin, posterior lobe at most weakly elevated, posterior margin straight to weakly concave, with rounded humeral angles; mesoscutum narrowly to broadly exposed; scutellum flat. Pretarsus as in figure 81E, F. *Hemelytron*: Short to

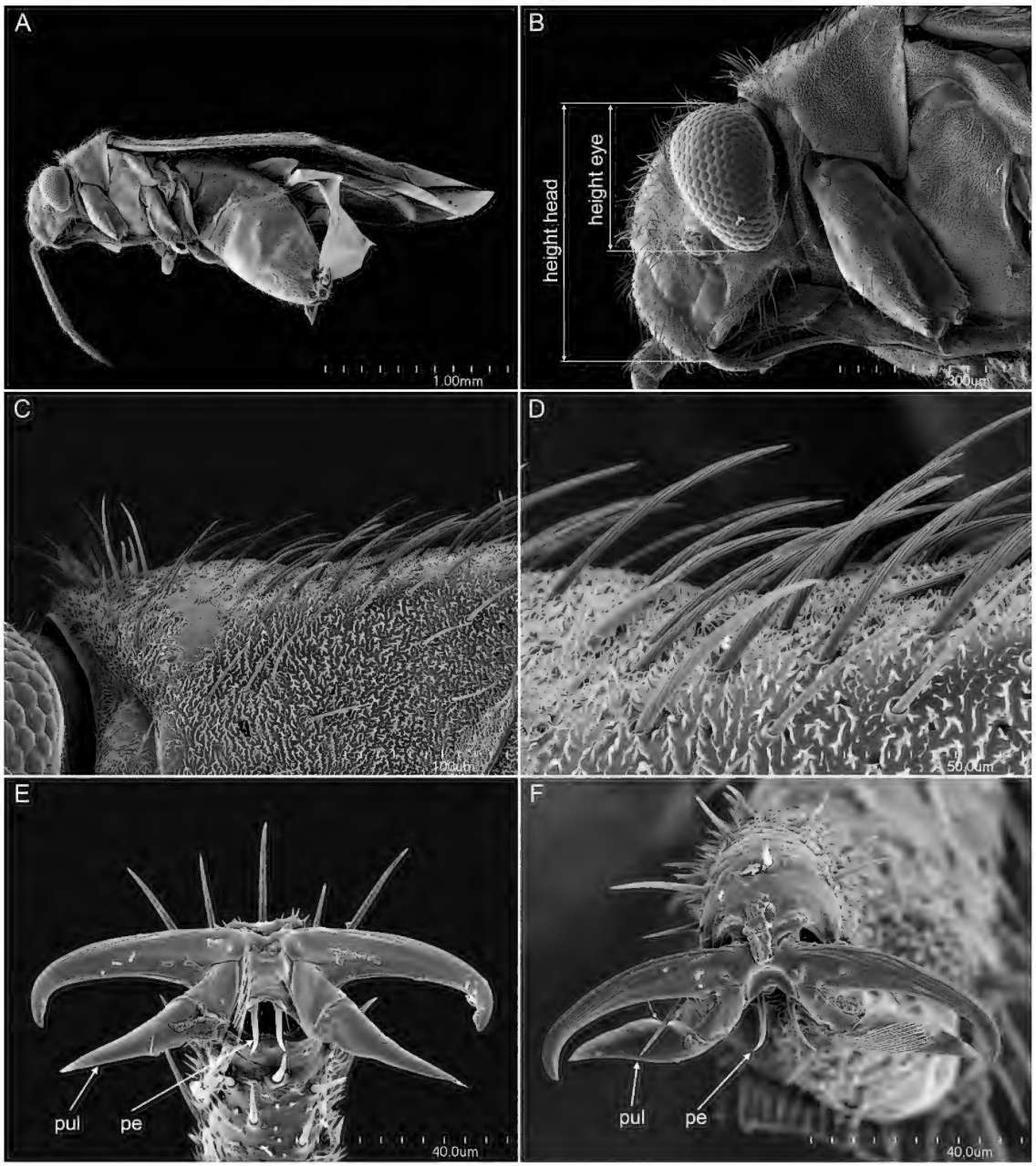
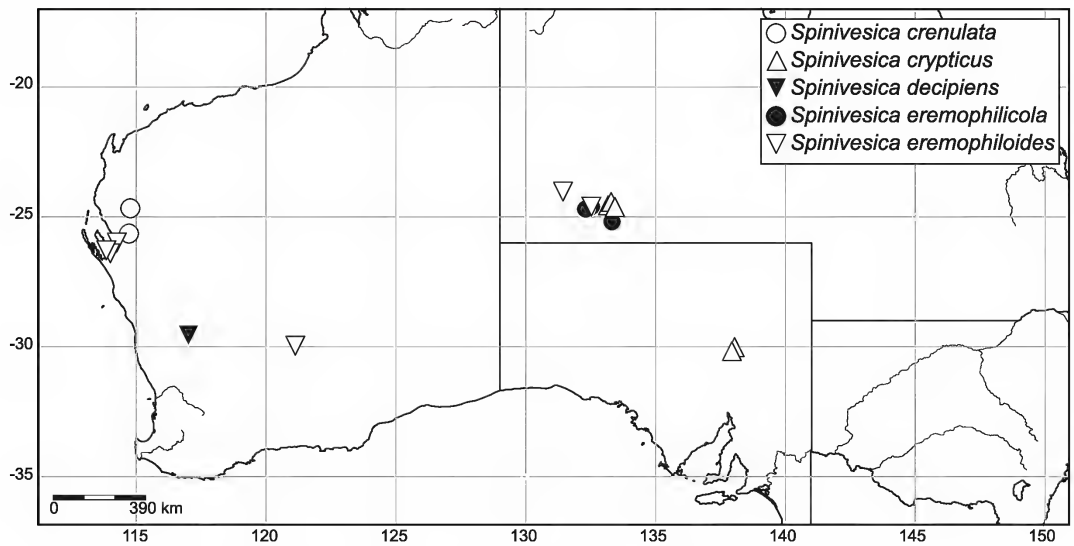


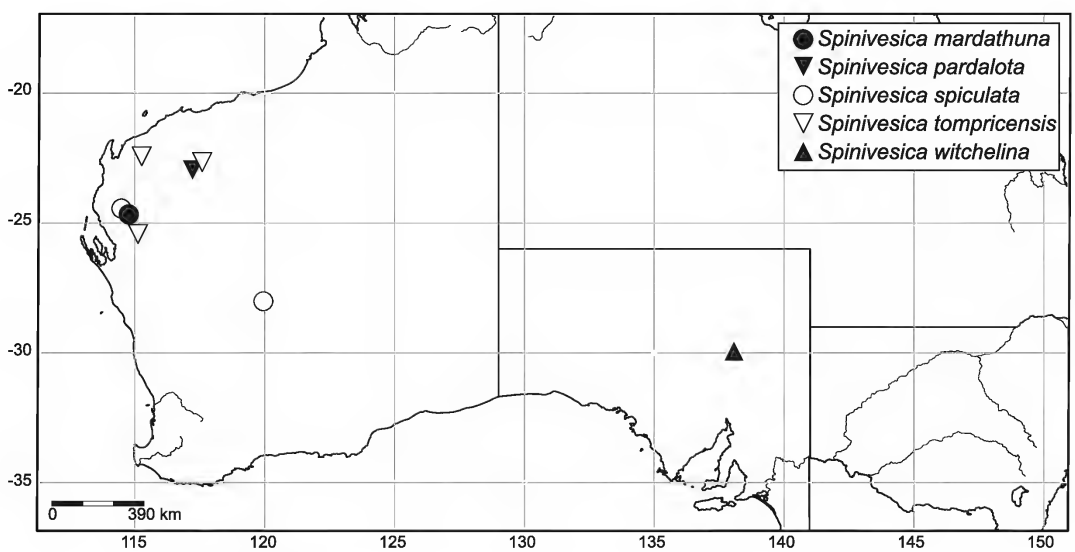
Fig. 81. *Spinivesica eremophiloides*. Scanning electron micrographs. **A.** Lateral view of specimen. **B.** Lateral view of head and prothorax, showing typical structure of head in Australian Cremnorrhinina. **C.** Enlarged view of prothorax. **D.** Detail of pronotal setae. **E.** Frontoventral view of pretarsus. **F.** Frontal view of pretarsus. Abbreviations: **pe**, parempodium; **pul**, pulvillus.

moderately elongate, corial margin nearly straight to weakly convex. GENITALIA (figs. 82–91, pl. 29): **Pygophore:** Apical portion elongate triangular with truncate posterior margin; rarely left margin of aperture with small flange. **Endosoma:** Sigmoid, rarely J-shaped; usually of moderately large size, rarely large, with at least one prominent



Map 21. Distribution of *Spinivesica crenulata–S. eremophiloides.*

lateral spine proximal or distal to secondary gonopore and with conspicuous, partially sclerotized, flattened, apical plate of variable conformation, beset with numerous surface and marginal microtrichia and usually supporting billowing or conforming membrane; middle of endosoma sometimes with variable shorter spine, usually laterally directed; secondary gonopore strongly sclerotized, usually situated subapically or rarely apically, within interstrap region. **Phallotheca:** Usually with two parallel ridges on dorsoposterior surface, dorsal aspect usually compressed and with strongly sclerotized crest; elongate ovoid aperture situated on anterior surface; aperture usually attenuate distad. **Parameres:** Left



Map 22. Distribution of *Spinivesica mardathuna–S. witchelina.*

paramere typically phyline, dorsoposterior margin not elevated above posterior and anterior processes, sometimes posterior margin enlarged and projecting posteriad; posterior process slender and straight or slightly deflected; anterior process relatively long, prominent seta—when present—situated on process. Right paramere usually small, somewhat swollen and lanceolate with one median terminal point; sometimes point or prominence lateral, rarely paramere with broadly flattened apex on posterior angle.

Female (pl. 28): Coloration and structure as in male, except eyes somewhat smaller, costal margin of hemelytron more strongly convex, and body form more strongly ovoid; total length 2.32–3.35, pronotum width 0.80–1.05. GENITALIA (pl. 54): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Very large, reaching beyond anterior margin by distance equal to length of dorsal labiate plate to just surpassing dorsal labiate plate. *First gonapophyses*: Very large to medium-sized wedge-shaped basal blocks. *Ventral labiate plate*: Large, wide, with nautiloid structure and undulate bifid surface to wide platelike medial anteroventral extension, spanning lateral of anterior surface of basal structures. **Dorsal labiate plate:** Very long, shield shaped. *Sclerotized rings*: Large, subcircular, gently concave, relatively thick walled. *Posteromedial region*: Surface without obvious microstructure. *Anterolateral region*: Exceeding anterior margin by one-half width of sclerotized ring. **Posterior wall:** *Intersegmental structure*: Wide, transverse, broadly prominent outpocket situated in middle of connecting membrane. *Interramal sclerites*: Well sclerotized, lateral sclerites wide, medial sclerite shield shaped.

Etymology: From the Latin, *spina*, "thorn," and *vesica*, in reference to the distinctive lateral spine on the endosoma, usually subtending the secondary gonopore. Gender feminine.

Discussion: The endosoma in *Spinivesica* shows substantial variability in the placement and structure of the spines. All species except *S. spiculata*, have a prominent, dorsally placed spine originating near the secondary gonopore. This spine is usually directed apically except in *S. mardathuna* and *S. tompricensis*, where the spine is directed laterally. Many species possess an additional prominent laterally directed spine placed near the midpoint of the endosoma proximad of the secondary gonopore; this spine is long in *S. crenulata*, *S. eremophilicola*, and *S. eremophiloides*, but short in *S. mardathuna* and *S. tompricensis*. Additionally, the position of the secondary gonopore is variable along the apical half of the endosoma, subapical in most species but nearly apical in *S. pardalota* and *S. witchelina*, or faintly sclerotized and of indeterminate position in *S. spiculata*. Regardless of the placement of prominent spines and the secondary gonopore, all the species we place in *Spinivesica* have a conspicuous flat apical sclerite of variable configuration beset with numerous microtrichia. In the diagnoses and descriptions presented below we have described the nature of the spines, but have not necessarily tried to lay out a theory of homology for all of the observed structures.

Spinivesica crenulata, new species
Figure 82, map 21, table 1, plates 28, 29

Diagnosis: Recognized uniquely among its congeners by appressed, flattened black setae on dorsum; membrane pale with a faint infuscate mark at apex of cells (pl. 28); distal portion of sigmoid endosoma with very large, undulating, strongly microtrichiate sclerotized plate, left ventral edge of plate forming narrow microtrichiate ribbon; endosoma with long reflected lateral spine on dorsal margin, short reflected apical spine, and two medial spines ventrad of secondary gonopore (fig. 82, pl. 29). Endosoma with long lateral spine at midpoint, similar to *S. eremophiloides,* but that species with a contrasting spot on corium at inner angle of cuneus, distal microtrichiate plate of endosoma without ribbonlike extension, and a long erect spine just distad of secondary gonopore and proximad of dorsal margin of microtrichiate sclerite.

Description: *Male:* Mean total length 2.68, mean pronotum width 0.87. COLORATION (pl. 28): Yellow, including all appendages (in preserved specimens); corium without infuscate mark adjacent to inner angle of cuneus; membrane pale with a faint dark marking at apex of cells. SURFACE AND VESTITURE

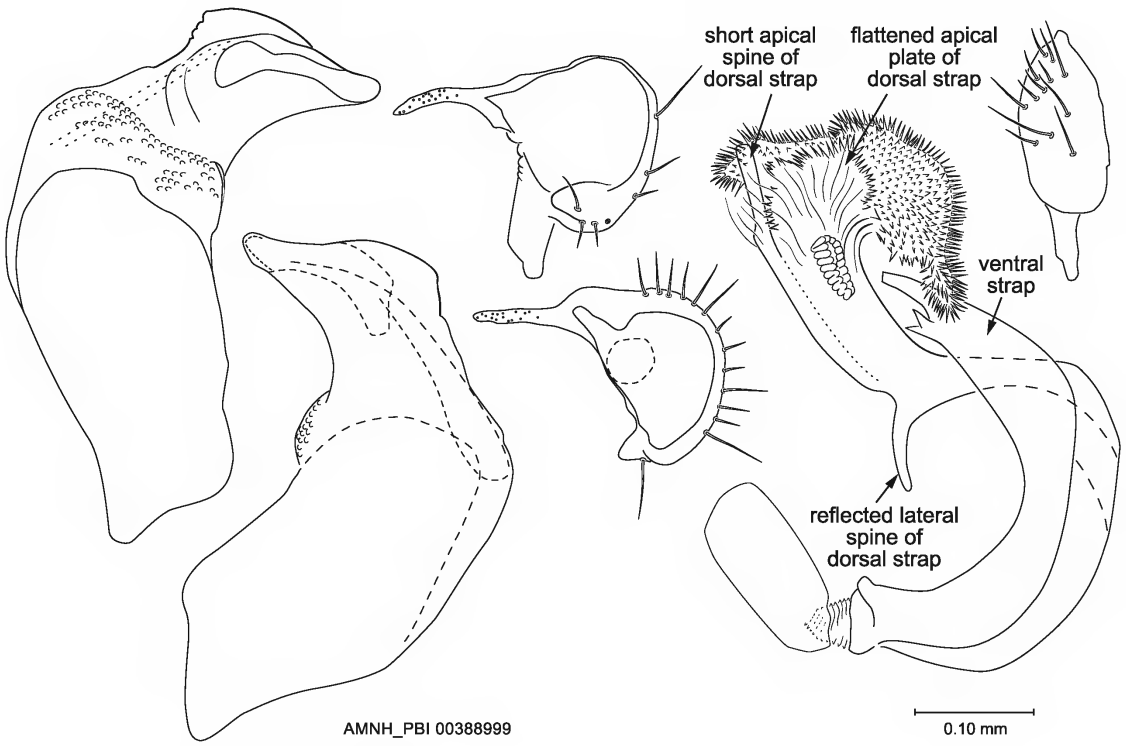

short apical spine of dorsal strap
flattened apical plate of dorsal strap
ventral strap
reflected lateral spine of dorsal strap
AMNH_PBI 00388999
0.10 mm

Fig. 82. Male genitalic structures of *Spinivesica crenulata*.

(pl. 28): Dorsum clothed with appressed, black, weakly flattened setae. STRUCTURE: **Head** (pl. 28): Eyes in lateral view occupying two-thirds height of head; antenna inserted at ventral margin of eye, eye not emarginate; antennal segment 2 short (0.50), 0.76 times width of head; labium reaching posterior margin of mesosternum. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin very weakly concave; mesoscutum broadly exposed. *Hemelytron*: Short, corial margin weakly convex. GENITALIA (fig. 82, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Sigmoid; ventral strap with short, stout bifid subapical spine, terminating at proximal margin of secondary gonopore in a fingerlike projection; dorsal strap with long reflected lateral spine at midpoint and short obscure spine apically; flattened apical plate large with undulating margin covered with strong microtrichia, left edge attenuate, forming microtrichiate strap. **Phallotheca:** Dorsal crest prominent; basal portion with transverse ridge on right margin. **Parameres:** Left paramere with dorsoposterior margin slightly elevated dorsad. Right paramere with medially placed terminal point.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 2.45, mean pronotum width 0.84.

Etymology: From the Latin, crenulatus, "having a little rounded projection," in reference to the structure of the phallotheca.

Hosts: Recorded from *Eremophila crenulata* and *E. fraseri* (Scrophulariaceae).

Distribution (map 21): Known from the Shark Bay area of Western Australia.

Holotype: **AUSTRALIA: Western Australia:** 12.6 km E of Meedo Homestead on Pimbee Rd, near Meedo Homestead, 25.62519°S 114.7252°E, 95 m, 04 Nov 2004, Cassis, Weirauch, Tatarnic, Symonds, *Eremophila crenulata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH6989209, 1♂ (AMNH_PBI 00388988) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia:** 12.6 km E of Meedo Homestead on Pimbee Rd, near Meedo Homestead, 25.62519°S 114.7252°E, 95 m, 04 Nov 2004, Cassis, Weirauch, Tatarnic, Symonds, *Eremophila crenulata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH6989209, 15♂ (00388984–00388987, 00388990–00388992, 00388994, 00388999–00389001, 00389004–00389006, 00389011), 19♀ (00389027, 00389029–00389031, 00389033–00389037, 00389039, 00389040, 00389042, 00389046–00389051, 00389060) (AM), 8♂ (00388989, 00388993, 00388995–00388998, 00389010, 00389012), 7♀ (00389028, 00389032, 00389038, 00389041, 00389043–00389045) (AMNH), 2♂ (00389002, 00389003), 3♀ (00389052–00389054) (UNSW), 3♂ (00389007–00389009), 5♀ (00389055–00389059) (WAMP). ca. 107.7 km SE of North West Coastal Hiway, on Mardathuna Rd (W of Kennedy Range National Park), 24.66376°S 114.7821°E, 163 m, 01 Nov 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Eremophila fraseri* F. Muell. (Scrophulariaceae), det. Perth staff PERTH6990185, 1♂ (00414410) (AMNH).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia:** 12.6 km E of Meedo Homestead on Pimbee Rd, near Meedo Homestead, 25.62519°S 114.7252°E, 95 m, 04 Nov 2004, Cassis, Weirauch, Tatarnic, Symonds, *Eremophila crenulata* Chinnock (Scrophulariaceae), det. PERTH staff PERTH6989209, 13 nymphs (00389014–00389026) (AM).

Spinivesica crypticus, new species
Figure 83, map 21, table 1, plates 28, 29

DIAGNOSIS: Recognized by the sigmoid endosoma with two sharp, curved, apical spines, an apical spatulate projection, and a discrete lunate microtrichiate plate situated on right lateral side even with secondary gonopore (fig. 83, pl. 29). Endosoma most similar to *S. spiculata*, but in that species endosoma much larger and shape of microtrichiate plate and arrangement of apical spines different.

DESCRIPTION: *MALE*: Mean total length 3.14, mean pronotum width 0.97. COLORATION (pl. 28): Yellow/green, including all appendages (in preserved specimens); corium with a faint infuscate mark adjacent to inner angle of cuneus; membrane pale with a faint dark marking at apex of cells. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with reclining, pale, simple setae. STRUCTURE: **Head** (pl. 28): Eyes in lateral view occupying two-thirds height of head; antenna inserted just above ventral margin of eye, eye not emarginate; antennal segment 2 short (0.62), 0.90 times width of head; labium slightly surpassing posterior margin of mesothorax. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin weakly concave; mesoscutum broadly exposed. *Hemelytron*: Short, corial margin weakly convex, overall form elongate ovoid. GENITALIA (fig. 83, pl. 29): **Pygophore:** Left margin of aperture with small flange. **Endosoma:** Ventral strap bifid apically with stout spines; dorsal strap bifid subapically with one terminal spatulate spine and long lateral spine supporting flattened, lunate, microtrichiate plate situated entirely on right plane of endosoma; dorsal strap without lateral spine near midpoint. **Phallotheca:** Dorsal crest short. **Parameres:** Left paramere with dorsoposterior margin expanded posteriad in dorsal view. Right paramere with medially placed, elongate, terminal point.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 2.90, mean pronotum width 0.95.

ETYMOLOGY: From the Greek, *crypticus*, "obscuring," in reference to our inability to recognize this taxon as distinct absent dissection of the male genitalia.

HOSTS: Recorded from *Eremophila longifolia* (pl. 38F, G), *E. sturtii* (pl. 39C–E), *E. willsii* (Scrophulariaceae), and *Atalaya hemiglauca* (Sapindaceae). We posit that the last record is not a host.

DISTRIBUTION (map 21): Known from the Alice Springs area of central Australia and adjacent South Australia.

HOLOTYPE: **AUSTRALIA: South Australia:** Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.15335°S 137.9362°E, 149 m, 12 Oct 2010, A. Namyatova, 1♂ (AMNH_PBI 00414403) (SAMA).

PARATYPES: **AUSTRALIA: Northern Territory:** 11.5 km NE of Henbury Homestead, 24.46528°S 133.31694°E, 441 m, 16 May 2013, M. Cheng, C. Bayer, & M. Colquhoun, *Eremophila sturtii* R. Br. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♀ (00414628) (UNSW).

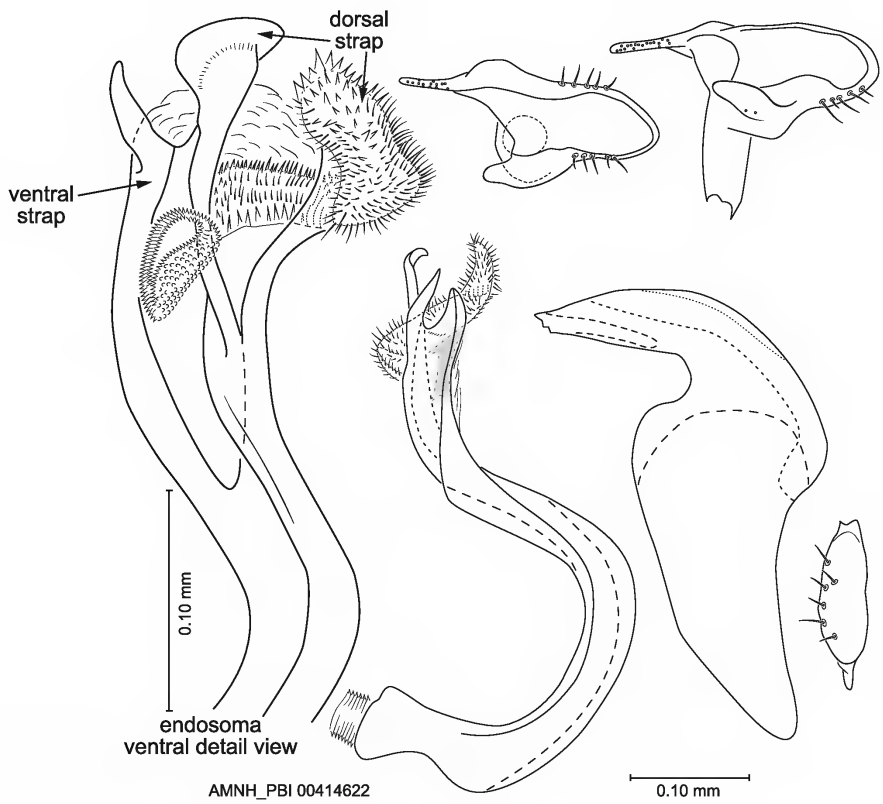


Fig. 83. Male genitalic structures of *Spinivesica crypticus*.

11 km W of Henbury Homestead at Henbury Meteorite craters, 24.57194°S 133.14861°E, 451 m, 17 May 2013, M. Cheng & C. Duykers, *Eremophila longifolia* (R. Br.) F. Muell. (Scrophulariaceae), det. NT Herbarium Staff – Alice Springs, 1♂ (00414622) (AMNH). 17 km N of Henbury Homestead, 8 km from Stuart Highway, 24.40028°S 133.29056°E, 485 m, 18 May 2013, M. Cheng & D. Azzi, *Atalaya hemiglauca* (F. Muell.) F. Muell. ex Benth. (Sapindaceae), det. NT Herbarium Staff – Alice Springs, 1♀ (00414626) (SAMA), *Atalaya hemiglauca* (F. Muell.) F. Muell. ex Benth. (Sapindaceae), det. NT Herbarium Staff – Alice Springs, 3♀ (00414623–00414625) (UNSW). Henbury Station, Claypan, 20.7 km SE from Henbury Homestead, 24.63456°S 133.43717°E, 413 m, 23 May 2013, M. Cheng, *Eremophila willsii* F. Muell. (Scrophulariaceae), 2♀ (00414629, 00414630) (UNSW). **South Australia:** Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 30.02083°S 138.04472°E, 212 m, 11 Oct 2010, A. Namyatova, 1♀ (00414405) (AMNH); 13 Oct 2010, A. Namyatova, 1♂ (00414404) (UNSW).

Spinivesica decipiens, new species
Figure 84, map 21, table 1, plates 28, 29

DIAGNOSIS: Recognized by the J-shaped to weakly sigmoid endosoma, reflected to left in dorsal view, long erect spine with wavy margins arising just proximal to secondary gonopore, a weakly sclerotized microtrichiate plate, and absence of a lateral spine on body of endosoma (fig. 84, pl. 29). This combination of features distinctive among known species of *Spinivesica*.

DESCRIPTION: *MALE*: Mean total length 3.77, mean pronotum width 1.04. COLORATION (pl. 28): Pale to yellow, including all appendages (in preserved specimens); corium with a faint infuscate mark adjacent to inner angle of cuneus; membrane pale with a distinct but

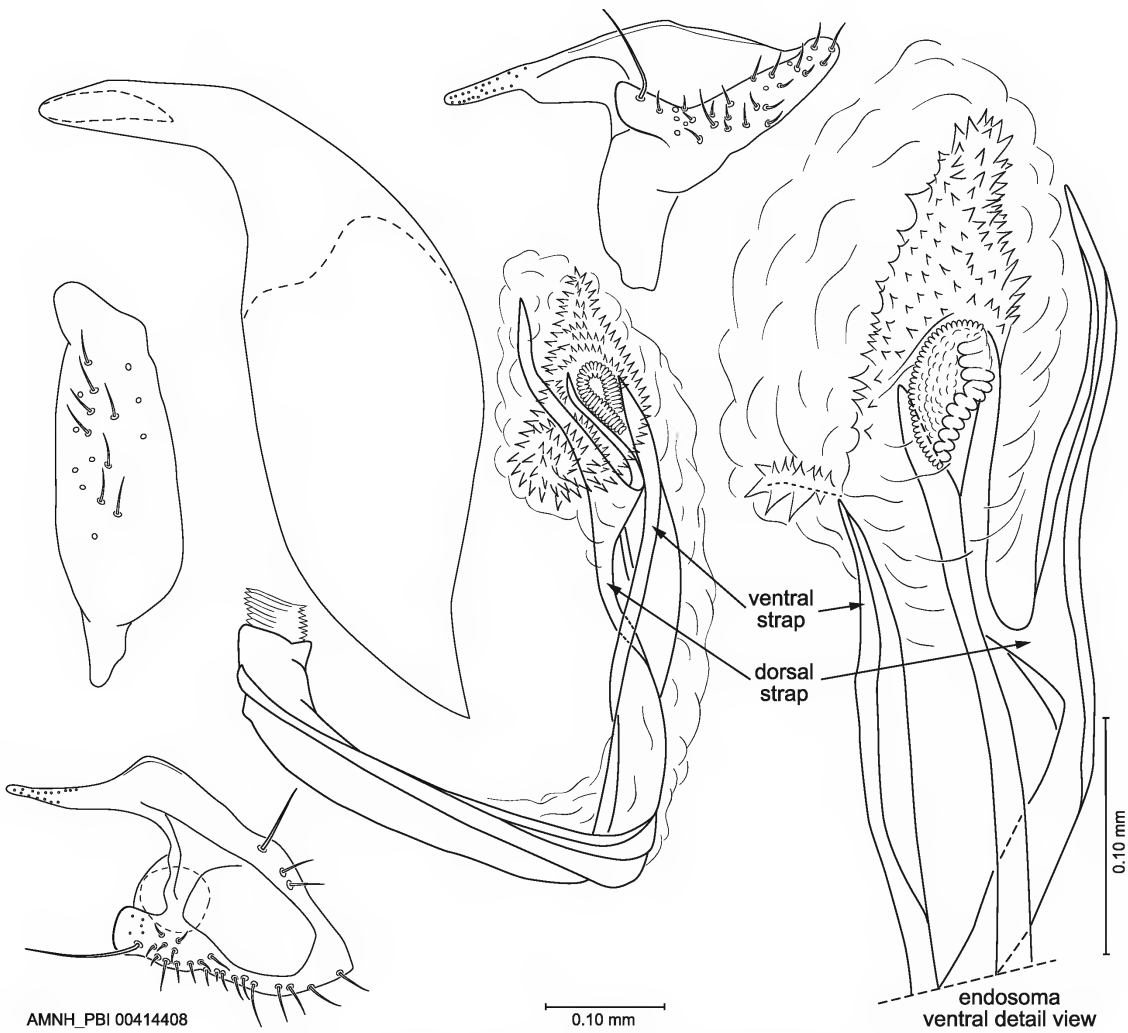


Fig. 84. Male genitalic structures of *Spinivesica decipiens*.

diffuse dark marking at apex of cells. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with reclining, pale, simple setae. STRUCTURE: **Head** (pl. 28): Eyes in lateral view occupying two-thirds height of head, antenna inserted at ventral margin of eye, eye weakly emarginate above insertion; antennal segment 2 moderately long (1.00), 1.22 times width of head; labium reaching to about apex of mesocoxa. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin weakly concave; mesoscutum moderately exposed. *Hemelytron*: Elongate, corial margin nearly straight, overall form very elongate ovoid; cuneus moderately elongate. GENITALIA (fig. 84, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Distal one-half strongly bent to left; dorsal strap bifid proximal to secondary gonopore, forming one long, narrow, distally projecting spine and another process supporting flattened microtrichiate plate and secondary gonopore; plate faint with opposite edge supported by distalmost portion of ventral strap; ventral strap terminating opposite subapicad of secondary gonopore. **Phallotheca:** Apical portion elongate, crest obscure. **Parameres:** Posterior process of left paramere strongly produced posteriad at midpoint in dorsal view; anterior process flattened. Right paramere relatively long, apex broadly and irregularly flattened on posterior angle.

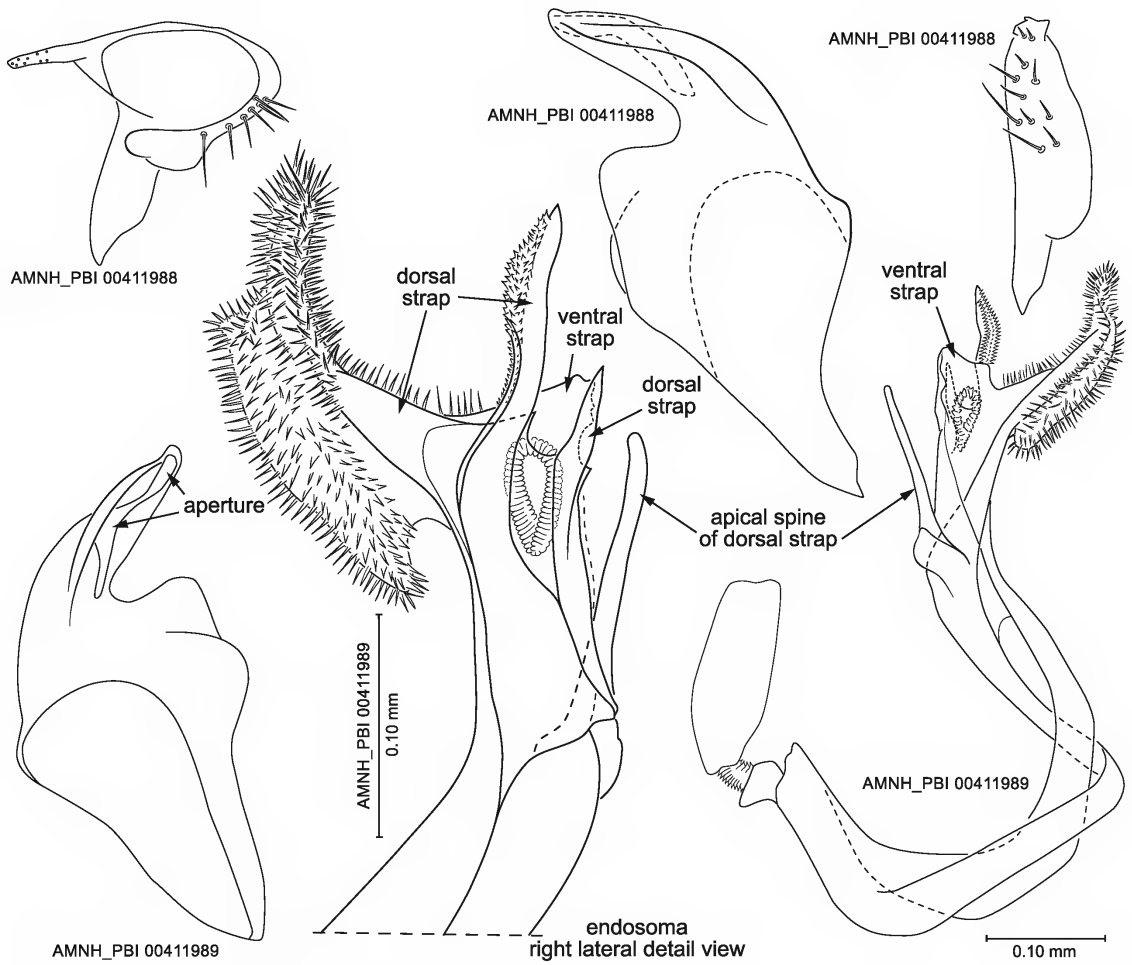


Fig. 85. Male genitalic structures of *Spinivesica eremophilicola*.

Female: Unknown.

Etymology: From the host name *Eremophila decipiens*.

Host: Recorded from *Eremophila decipiens* (Scrophulariaceae).

Distribution (map 21): Known from the Charles Darwin Nature Reserve, 350 km NNE of Perth, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, track to Seven Mile Well, N of Wanarra Rd, 29.57413°S 117.02055°E, 326 m, 24 Sep 2009, C. Symonds, *Eremophila decipiens* Ostenf. (Scrophulariaceae), det. WA Herbarium, 1♂ (AMNH_PBI 00414407) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** Charles Darwin Reserve, track S of Seven Mile Well, 29.53227°S 117.00569°E, 300 m, 23 Sep 2009, C. Symonds, (Scrophulariaceae), det. WA Herbarium, 1♀ (00387547) (AMNH), 5♂ (00387537–00387541), 3♀ (00387544–00387546) (UNSW), 2♂ (00387542, 00387543), 2♀ (00387548, 00387549) (WAMP). Charles Darwin Reserve, track to Seven Mile Well, N of Wanarra Rd, 29.57413°S 117.02055°E, 326 m, 24 Sep 2009, C. Symonds, *Eremophila decipiens* Ostenf. (Scrophulariaceae), det. WA Herbarium, 2♂ (00414406, 00414408) (AMNH).

Spinivesica eremophilicola, new species
Figure 85, map 21, table 1, plates 28, 29

Diagnosis: Recognized by sigmoid endosoma with a long, narrow, apically directed

subapical spine on midpoint of dorsal surface directed to left side and apically with a moderately long, broad, denticulate spine, a small sharp spine, and an undulating, marginally microtrichiate, sclerotized plate (fig. 85, pl. 29). Form of microtrichiate plate is distinctive among species of *Spinivesica*; long, apically directed, subapical spine also seen in *S. decipiens* and possibly *S. witchelina*.

DESCRIPTION: *MALE*: Mean total length 2.42, mean pronotum width 0.81. COLORATION (pl. 28): Yellow, including all appendages (in preserved specimens); corium with a faint infuscate mark adjacent to inner angle of cuneus; membrane without dark marking at apex of cells. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with reclining, dark, simple setae. STRUCTURE: **Head** (pl. 28): Eyes in lateral view occupying slightly more than one-half height of head; antenna inserted at just above ventral margin of eye, eye not emarginate; antennal segment 2 short (0.50), 0.89 times width of head; labium surpassing apex of metacoxa and reaching onto abdomen. **Thorax** (pl. 28): Pronotum with lateral margin nearly straight, posterior margin very weakly concave; mesoscutum broadly exposed. *Hemelytron*: Short, corial margin weakly convex, overall form ovoid. GENITALIA (fig. 85, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Dorsal strap with long, slender, apically directed spine on left side and originating considerably proximad of secondary gonopore, and apically bifid with one smooth pointed spine, another longer denticulate spine, and a flattened plate with undulating microtrichiate margin; ventral strap terminating in relatively wide sclerotized process even with secondary gonopore; secondary gonopore situated at bases of apicalmost spines. **Phallotheca:** Apical portion smooth, strongly sclerotized; dorsal crest well developed. **Parameres:** Left paramere with dorsoposterior margin somewhat produced posteriad. Right paramere moderately elongate, apex truncate with a short spine on anterior angle and a small additional prominence on posterior angle.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 2.55, mean pronotum width 0.85.

ETYMOLOGY: From the host genus *Eremophila* and the Latin suffix *-cola*, "dweller."

HOST: Recorded from *Eremophila* sp. (Scrophulariaceae).

DISTRIBUTION (map 21): Known from the Alice Springs area of central Australia.

HOLOTYPE: **AUSTRALIA: Northern Territory:** ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666254, 1♂ (AMNH_PBI 00411957) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 17.5 km E of Stuart Hiway on Horseshoe Bend Rd, 25.16667°S 133.3223°E, 412 m, 29 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW658406, 8♂ (00411927–00411934), 3♀ (00411935–00411937) (AMNH). ~66 km N of Lasseter Hiway on Luritja Road, 24.68335°S 132.3212°E, 545 m, 02 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID, 1♂ (00412057), 3♀ (00412058–00412060) (AMNH). ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666254, 23♂ (00411955, 00411956, 00411958–00411964, 00411966–00411972, 00411974–00411976, 00411978, 00411979, 00411987, 00411990), 25♀ (00412021–00412029, 00412031–00412033, 00412035, 00412037–00412048) (AM), 17♂ (00411965, 00411973, 00411977, 00411986, 00411988, 00411989, 00411991–00412001), 20♀ (00412005–00412018, 00412020, 00412030, 00412034, 00412036, 00412049, 00412054) (AMNH), 6♂ (00411952–00411954, 00412002–00412004), 1♀ (00412019) (MNT), 6♂ (00411980–00411985), 6♀ (00412050–00412053, 00412055, 00412056) (UNSW).

Spinivesica eremophiloides, new species
Figures 81, 86, map 21, table 1, plates 28, 29, 54D–G

DIAGNOSIS: Recognized by the sigmoid endosoma, with long lateral spine at about midpoint and perpendicular to body of endosoma; apically with long erect spine on dorsal margin and with a large undulating and folded microtrichiate plate without a narrow

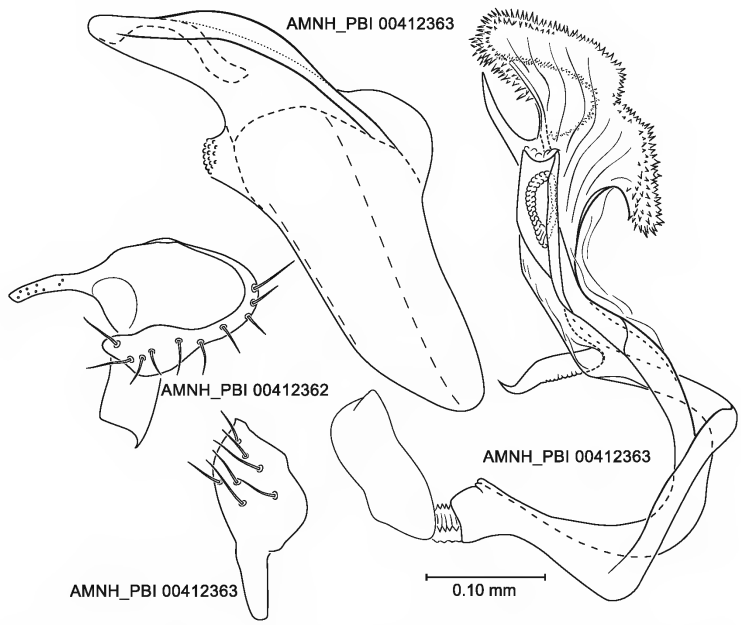


Fig. 86. Male genitalic structures of *Spinivesica eremophiloides.*

ribbonlike extension as in *S. eremophilicola* (fig. 86, pl. 29). Long lateral spine of endosoma similar to that of *S. crenulata,* but that species without dark spot at inner angle of cuneus, distal microtrichiate plate of endosoma larger and with a ribbonlike extension on ventral left side, and dorsodistal margin of endosoma with only a short erect spine.

Description: *Male*: Mean total length 2.84, mean pronotum width 0.88. COLORATION (pl. 28): Yellow, including all appendages (in preserved specimens); corium with an intense infuscate mark adjacent to inner angle of cuneus; membrane with at most a faint dark marking at apex of cells. SURFACE AND VESTITURE (fig. 81B–D, pl. 28): Dorsum clothed with reclining, dark, simple setae. STRUCTURE: **Head** (fig. 81A, B, pl. 28): Eyes occupying two-thirds height of head in lateral view; antenna inserted just above ventral margin of eye, eye not emarginate; antennal segment 2 short (0.56), 0.89 times width of head; labium reaching to apex of mesocoxa. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin very weakly concave; mesoscutum moderately exposed. Pretarsus as in figure 81E, F. *Hemelytron*: Short, corial margin weakly convex, overall form ovoid; cuneus short. GENITALIA (fig. 86, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Dorsal strap with a long, erect, robust, pointed spine at about midpoint, bifid subapically with one long, slender, apically projecting spine originating distad of secondary gonopore and another process supporting flattened microtrichiate plate with undulating folded margin, strongly projecting parallel with plane of endosoma; ventral strap terminating in narrow sclerotized process at level of apically situated secondary gonopore. **Phallotheca:** Apical portion smooth, strongly sclerotized; dorsal crest well developed; base of apical portion with small outpocket on left side with denticulate posterior surface. **Parameres:** Left paramere with dorsoposterior margin somewhat produced posteriad. Right paramere short and broad with medially placed terminal point.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 2.87, mean pronotum width 0.92. GENITALIA as in plate 54D–G.

Etymology: From the host *Eremophila* and the Latin suffix *-oides*, "like or having the form of."

HOSTS: Recorded from *Eremophila clarkei* (pl. 37D, E), *E. platythamnos* (pl. 38H), and *Eremophila* sp. (Scrophulariaceae).

DISTRIBUTION (MAP 21): Known from the Alice Springs area of central Australia and the Gold Fields–Shark Bay region of Western Australia.

DISCUSSION: This taxon was included in the analysis of Menard et al. (2014) as New Genus Australia 353, and as shown in figure 1 of the present paper.

HOLOTYPE: **AUSTRALIA: Northern Territory:** ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666260, 1♂ (AMNH_PBI 00412351) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** 33.9 km NW of Kings Canyon Resort, Watarrka National Park, 24.01667°S 131.4523°E, 743 m, 03 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666314, 13♂ (00412528–00412540), 43♀ (00412541–00412583) (AMNH), 8♀ (00412584–00412591) (MNT). ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666260, 12♂ (00412334–00412338, 00412371–00412377), 57♀ (00412391–00412414, 00412479–00412511) (AM), 25♂ (00412334–00412350, 00412352, 00412353, 00412356, 00412362–00412365, 00412385), 106♀ (00412391–00412470, 00412476, 00412479–00412500, 00412520–00412522) (AMNH), 2♂ (00412367, 00412368), 1♀ (00412475) (ANIC), 2♂ (00412360, 00412361), 2♀ (00412473, 00412474) (CNC), 4♂ (00412354, 00412355, 00412357, 00412358), 8♀ (00412512–00412519) (MNT), 10♂ (00412378–00412384, 00412386–00412388) (UNSW), 2♀ (00412477, 00412478) (USNM), 2♂ (00412359, 00412366), 2♀ (00412471, 00412472) (ZISP). **Western Australia:** 24 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.39014°S 114.0094°E, 60 m, 26 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 6989829, 19♂ (00388898, 00388901–00388906, 00388908, 00388910–00388914, 00388917–00388920, 00389827, 00389835), 21♀ (00388941–00388945, 00388947–00388951, 00388953, 00388955–00388961, 00388963, 00388971, 00388972) (AM), 20♂ (00412261–00412274, 00388896, 00388897, 00388899, 00388900, 00388907, 00388909), 18♀ (00412282–00412293, 00388946, 00388952, 00388954, 00388962, 00388964, 00388965) (AMNH), 9♂ (00388915, 00388916, 00389828–00389834), 10♀ (00388966–00388969, 00389836–00389841) (WAMP). 26 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.26835°S 113.8491°E, 15 m, 25 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. Field ID, 3♂ (00388976–00388978), 5♀ (00388979–00388983) (AM). Gladstone, 25.95428°S 114.2464°E, 04 Nov 2004, Cassis, Weirauch, Tatarnic, Symonds, 3♂ (00389824–00389826) (AM). ca 35 km S of Menzies, 29.96214°S 121.1323°E, 600 m, 24 Oct 1996, Schuh and Cassis, *Eremophila platythamnos* Diels subsp. *platythamnos* (Scrophulariaceae), det. PERTH staff PERTH 05054796, 2♂ (00389185, 00389186), 4♀ (00389187–00389190) (AM). *Eremophila platythamnos* Diels *platythamnos* (Scrophulariaceae), det. PERTH staff PERTH 05054818, 4♂ (00137406–00137409), 5♀ (00137410–00137414) (AMNH), 3♀ (00137415-AMNH_PBI 00137417) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Northern Territory:** ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666260, 1adult sex unknown (00412389), 1 nymph (00412390) (UNSW). **Western Australia:** 24 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area, 26.39014°S 114.0094°E, 60 m, 26 Oct 2004, Cassis, Wall, Weirauch, Symonds, *Eremophila clarkei* A.F. Oldfield & F. Muell. (Scrophulariaceae), det. PERTH staff PERTH 6989829, 23 nymphs (00388921–00388940, 00389843–00389845) (AM), 1 adult sex unknown (00412275), 6 nymphs (00412276–00412281) (AMNH).

Spinivesica mardathuna, new species

Figure 87, map 22, table 1, plates 28, 29

DIAGNOSIS: Recognized by the entirely weak yellow coloration (in preserved specimens), lack of markings on hemelytron (pl. 28); endosoma sigmoid with a short, lateral spine

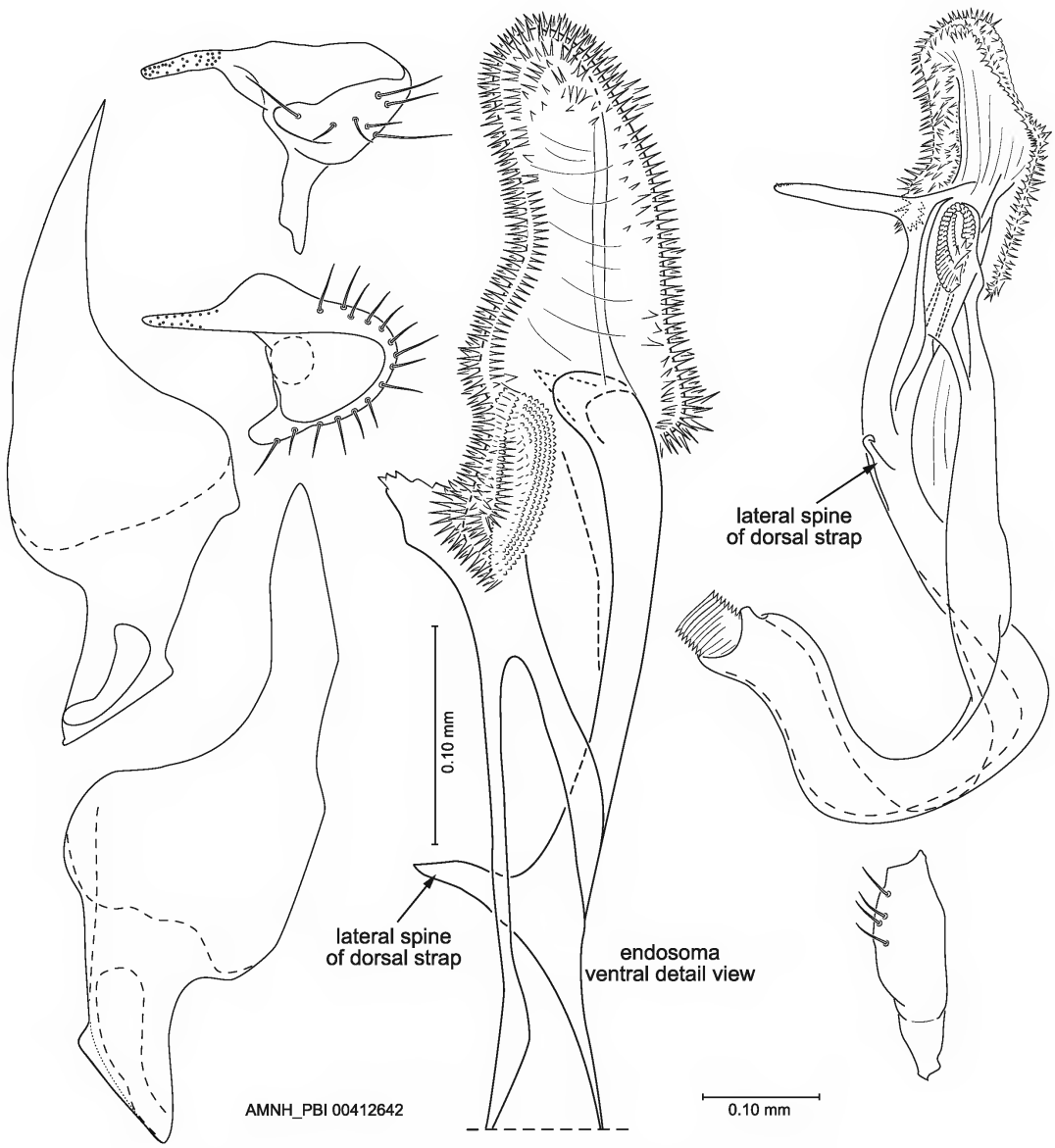


Fig. 87. Male genitalic structures of *Spinivesica mardathuna.*

at midpoint, a long, erect subapical spine, opposite secondary gonopore at right angles to body of vesica, and an apical, weakly sclerotized, marginally microtrichiate plate; ventral and dorsal straps conspicuously separated medially; a small marginally serrate flange on left side of ventral strap lateral to secondary gonopore (fig. 87, pl. 29). Endosoma similar to that of *S. tompricensis*, but that species distinguished by flattened microtrichiate plate with a rolled apicalmost edge and attenuate proximal extension surpassing secondary gonopore; in *S. mardathuna* apicalmost edge flat and proximal extension of flattened microtrichiate plate terminating even with the secondary gonopore projection.

Description: *Male*: Mean total length 3.17, mean pronotum width 1.01. COLORATION (pl. 28): Weakly yellow, including all

appendages (in preserved specimens); corium and membrane without markings. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with recumbent, pale, simple setae. STRUCTURE: **Head** (pl. 28): Eye occupying two-thirds height of head in lateral view; antenna inserted just above ventral margin of eye, eye emarginate at insertion; antennal segment 2 short (0.58), 0.77 times width of head; labium reaching apex of procoxa. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin weakly concave; mesoscutum broadly exposed. *Hemelytron*: Short, corial margin weakly convex, overall form ovoid; cuneus short. GENITALIA (fig. 87, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Straps conspicuously diverging medially and merging again even just proximal to secondary gonopore; dorsal strap at about midpoint with a short lateral spine, subapically with one long, narrow, distally projecting spine originating just distad of secondary gonopore, and apically with a flattened finely microtrichiate plate with undulating margin, projecting parallel with plane of endosoma; apicalmost portion of plate with flat edge; proximal end of microtrichiate plate extending to even with secondary gonopore; ventral strap terminating in transverse sclerotized flange with serrate margin even with secondary gonopore, sometimes flange truncate; secondary gonopore subapical. **Phallotheca:** Distal portion smooth, moderately sclerotized; dorsal crest well developed. **Parameres:** Left paramere with dorsoposterior margin somewhat produced posteriad. Right paramere with medially placed terminal point and a weak prominence on posterior angle.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 3.05, mean pronotum width 1.02.

Etymology: From the place name Mardathuna, Western Australia, near the type locality; a noun in apposition.

Host: Recorded from *Eremophila fraseri* (Scrophulariaceae).

Distribution (map 22): Known from type locality, Kennedy Range National Park NE of Shark Bay, Western Australia.

Holotype: **AUSTRALIA: Western Australia:** ca. 107.7 km SE of North West Coastal Hiway, on Mardathuna Rd (W of Kennedy Range National Park), 24.66376°S 114.7821°E, 163 m, 01 Nov 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Eremophila fraseri* F. Muell. (Scrophulariaceae), det. PERTH staff PERTH6990185, 1♂ (AMNH_PBI 00412 641) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** ca. 107.7 km SE of North West Coastal Hiway, on Mardathuna Rd (W of Kennedy Range National Park), 24.66376°S 114.7821°E, 163 m, 01 Nov 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Eremophila fraseri* F. Muell. (Scrophulariaceae), det. PERTH staff PERTH6990185, 1♂ (00412642), 2♀ (00412644, 00412647) (AM), 1♀ (00412646) (AMNH), 2♀ (00412643, 0041 2645) (WAMP).

Spinivesica pardalota, new species
Figure 88, map 22, table 1, plates 28, 29

Diagnosis: Recognized by the large size, strong black marking on corium at inner angle of cuneus (pl. 28), sigmoid endosoma with weakly sclerotized, marginally microtrichiate, distal plate flanking secondary gonopore on right side, a pair of stout diverging spines proximal to secondary gonopore, and absence of a lateral spine at midpoint of endosoma (fig. 88, pl. 29). Distally projecting flattened sclerite of endosoma reminiscent of *Grandivesica agnew*, but side by side comparison indicating placement of these two species in different genera on basis of several features.

Description: *Male*: Mean total length 3.64, mean pronotum width 1.05. COLORATION (pl. 28): Yellow, including all appendages (in preserved specimens); corium with an intense infuscate mark adjacent to inner angle of cuneus; membrane with at most a faint dark marking at apex of cells. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with reclining, dark, simple setae. STRUCTURE: **Head** (pl. 28): Eyes occupying three-quarters height of head; antenna inserted just above ventral margin of eye; antennal segment 2 relatively short (0.73), 1.04 times width of head; labium reaching to about posterior margin of mesosternum. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin very weakly concave; mesoscutum moderately exposed. *Hemelytron*: Short, corial margin weakly convex, overall

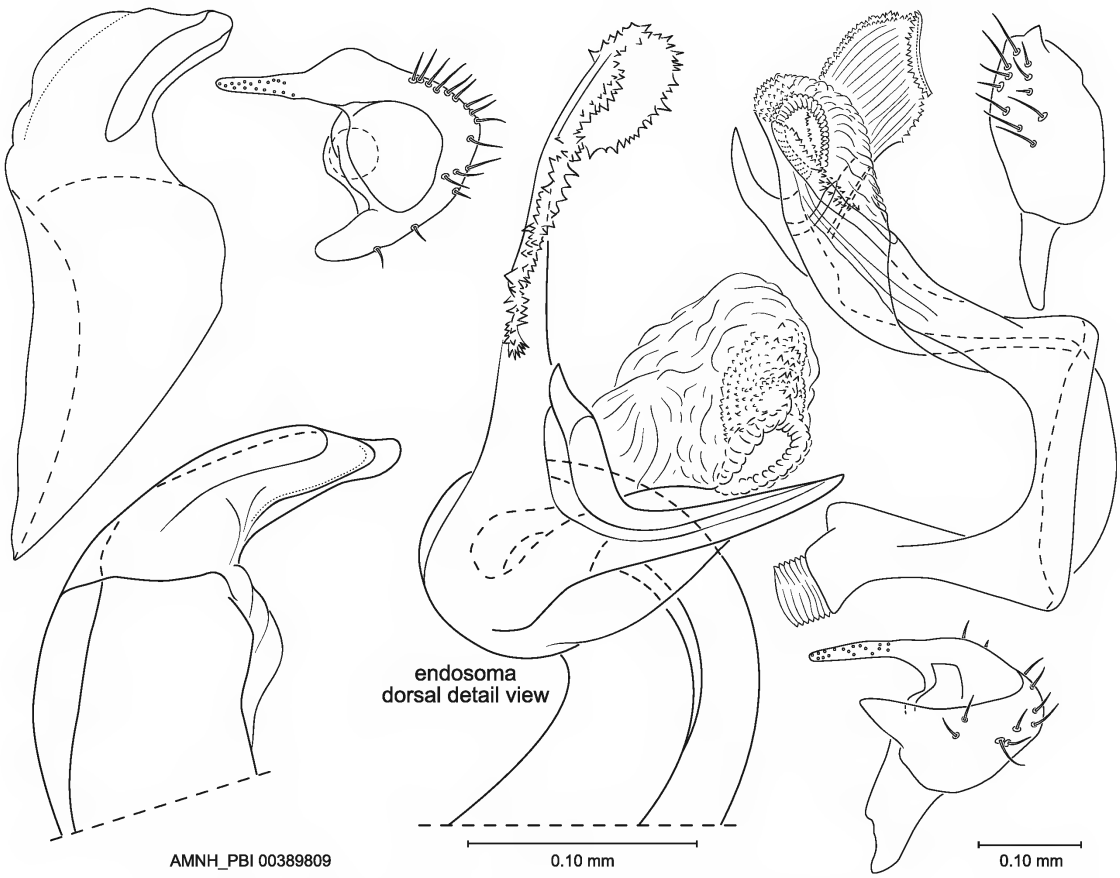


Fig. 88. Male genitalic structures of *Spinivesica pardalota*.

form ovoid; cuneus short. GENITALIA (fig. 88, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Sigmoid, very strongly curving in midsection; ventral strap attenuate, forming narrow curving spine, merging with spinose membrane encapsulating left side of secondary gonopore; dorsal strap apically forming bifid, diverging, broad clawlike spines and flanked on right by flattened plate extending beyond gonopore and with microtrichiate border, ventral edge of plate rolled to left. **Phallotheca:** Dorsal surface with strong crest curved to left; aperture anteroventral. **Parameres:** Left paramere with dorsoposterior margin slightly elevated dorsad; posterior and anterior processes long. Right paramere with irregular apex and short, medial, apical spine.

Female: Unknown.

ETYMOLOGY: From the Greek, *pardalotus*, "spotted like a leopard," in reference to the strong spots on the corium at the inner angle of the cuneus.

HOST: Recorded from *Eremophila platycalyx* subsp. *pardalota* (Scrophulariaceae).

DISTRIBUTION (map 22): Known only from the type locality west of Tom Price, Pilbara District, Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 83 km W of Tom Price on Nanutarra Rd, 22.97922°S 117.23177°E, 360 m, 28 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila platycalyx* F. Muell. *pardalota* (Scrophulariaceae), det. Perth staff PERTH 7273339, 1♂ (AMNH_PBI 00389809) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 83 km W of Tom Price on Nanutarra Rd, 22.97922°S 117.23177°E, 360 m, 28

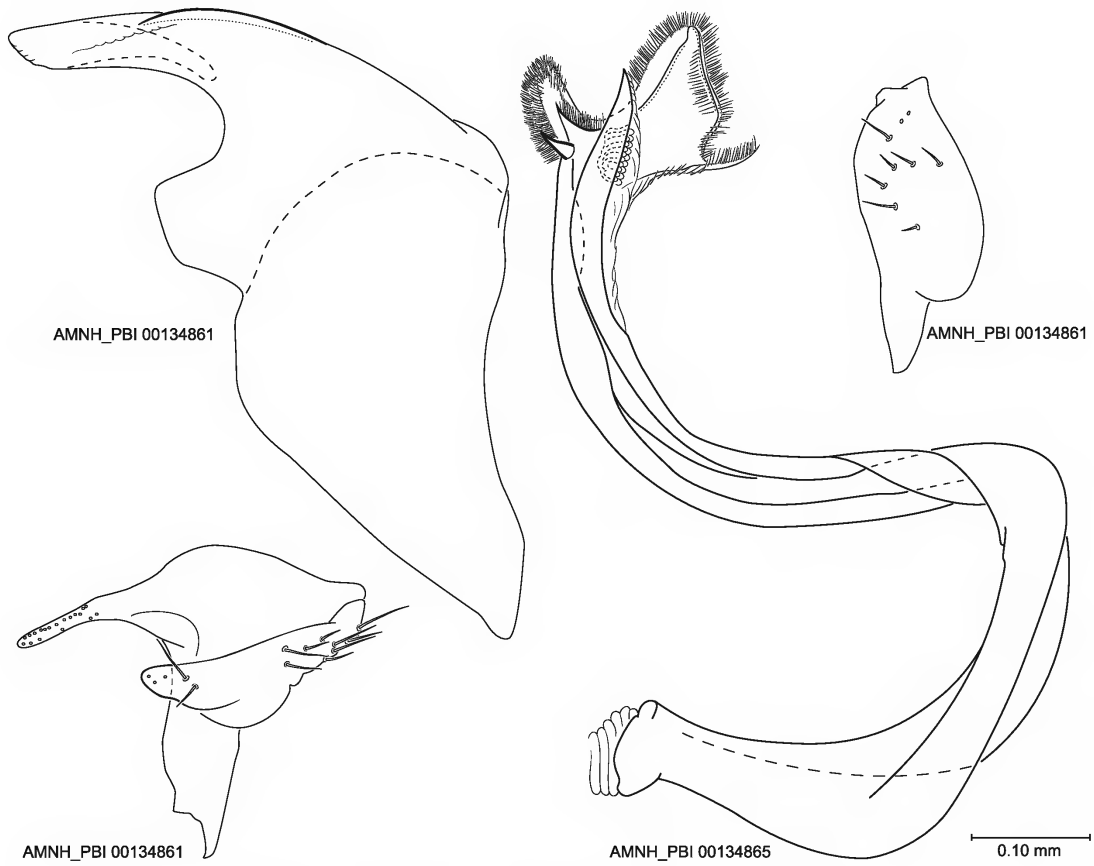


Fig. 89. Male genitalic structures of *Spinivesica spiculata*.

Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila platycalyx* F. Muell. *pardalota* (Scrophulariaceae), det. Perth staff PERTH 7273339, 1♂ (00389813) (AM).

Spinivesica spiculata, new species
Figure 89, map 22, table 1, plates 28, 29, 54A–C

Diagnosis: Recognized by the long, sigmoid endosoma with an apical microtrichiate plate with strong undulating border giving plate a bifurcate profile and a pair of distally directed spines confined within contour of microtrichiate plate; endosoma without a median lateral spine (fig. 89, pl. 29). Absence of conspicuous medial or subapical spines projecting beyond contour of microtrichiate plate unlike all other *Spinivesica* spp.; presence of a distally projecting flattened microtrichiate plate supporting generic placement of *S. spiculata*.

Description: *Male*: Mean total length 3.20, mean pronotum width 0.98. COLORATION (pl. 28): Pale, including all appendages (in preserved specimens); corium with weak infuscate mark adjacent to inner angle of cuneus; membrane with diffuse dark marking at apex of cells. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with reclining, pale, simple setae. STRUCTURE: **Head** (pl. 28): Eyes occupying two-thirds height of head in lateral view; antenna inserted just above ventral margin of eye, eye emarginate at insertion; antennal segment 2 short (0.64), 0.97 times width of head; labium reaching apex of mesocoxa. **Thorax** (pl. 28): Pronotum with lateral margin nearly straight, posterior margin very weakly concave; mesoscutum moderately exposed. *Hemelytron*: Weakly elongate, corial margin

weakly convex, overall form ovoid; cuneus short. GENITALIA (fig. 89, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Elongate, dorsal strap without separate conspicuous spine proximal to secondary gonopore; ventral strap terminating at level of secondary gonopore as distally directed spine, and without a median lateral spine; dorsal strap with small curved subapical spine, and a broad microtrichiate plate with strongly undulating margin; secondary gonopore subapical. **Phallotheca:** Dorsal surface with short crest, base of apical portion with large basal outpocket. **Parameres:** Left paramere with dorsoposterior margin slightly expanded posteriad and elevated dorsad, posterior and anterior processes relatively large, apex of posterior process deflected. Right paramere with small point on anterior angle and small prominence on posterior angle.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 3.06, mean pronotum width 0.96. GENITALIA: As in plate 54A–C.

Etymology: From the Latin, *spiculatus*, in reference to the spines on the endosoma.

Hosts: Recorded from *Eremophila setacea* (pl. 39A) and *E. spuria* (pl. 39B) (Scrophulariaceae).

Distribution (map 22): Known from the Gold Fields and central coast of Western Australia.

Holotype: **AUSTRALIA: Western Australia:** 80.2 km W of Agnew toward Sandstone, 28.00117°S 119.9593°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Eremophila spuria* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05056160, 1♂ (AMNH_PBI 00134853) (WAMP).

Paratypes: **AUSTRALIA: Western Australia:** 66.2 km E of North West Coastal Hiway on Mardathuna Rd, 24.45443°S 114.5233°E, 103 m, 01 Nov 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Eremophila setacea* Chinnock (Scrophulariaceae), det. PERTH staff PERTH6990010, 2♂ (00389759, 00389760), 2♀ (00389761, 00389762) (AM). 80.2 km W of Agnew toward Sandstone, 28.00117°S 119.9593°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Eremophila spuria* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05056160, 8♂ (00389198, 00389199, 00389202–00389205, 00389211, 00087465), 3♀ (00389208, 00389210, 00389214) (AM), 10♂ (00134850–00134852, 00134854, 00134855, 00389200, 00389201, 00134857, 00134861, 00134849), 12♀ (00134863–00134871, 00134875–00134877), 1♂ (00087206) (AMNH), 6♂ (00134856, 00134858–00134860, 00134862, 00389209), 6♀ (00134872–00134874, 00134878, 00389206, 00389207) (WAMP).

Other Specimens Examined: **AUSTRALIA: Western Australia:** 80.2 km W of Agnew toward Sandstone, 28.00117°S 119.9593°E, 650 m, 26 Oct 1996, Schuh and Cassis, *Eremophila spuria* Chinnock (Scrophulariaceae), det. PERTH staff PERTH 05056160, 2 nymphs (00389212, 00389213) (AM).

Spinivesica tompricensis, new species
Figure 90, map 22, table 1, plates 28, 29

Diagnosis: Recognized by the elongate parallel-sided body form (pl. 28), endosoma sigmoid with a short lateral spine at midpoint, a long, proximally directed subapical spine, and terminating in a weakly sclerotized, marginally finely microtrichiate plate; ventral and dorsal straps conspicuously separated medially; small marginally serrate or pointed flange laterad of secondary gonopore (fig. 90, pl. 29). Endosoma similar to *S. mardathuna*, but that species distinguished by flat apicalmost edge, shorter nonattenuate proximal extension of flattened microtrichiate plate, subapical spine at right angles to axis of endosoma, and lateromedial spine very small; in *S. tompricensis* apicalmost edge rolled and proximal region of flattened microtrichiate plate attenuate, extending beyond secondary gonopore as a narrow band, subapical spine directed proximally along axis of endosoma, and lateromedial spine easily visible.

Description: *Male*: Mean total length 3.39, mean pronotum width 1.01. COLORATION (pl. 28): Pale greenish, including all appendages (in preserved specimens); corium with and membrane without markings. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with reclining, pale, simple setae. STRUCTURE: **Head** (pl. 28): Eyes occupying two-thirds height of head in lateral view; antenna inserted just above ventral margin of eye, eye very weakly emarginate at insertion; antennal segment 2 short (0.68), 0.99

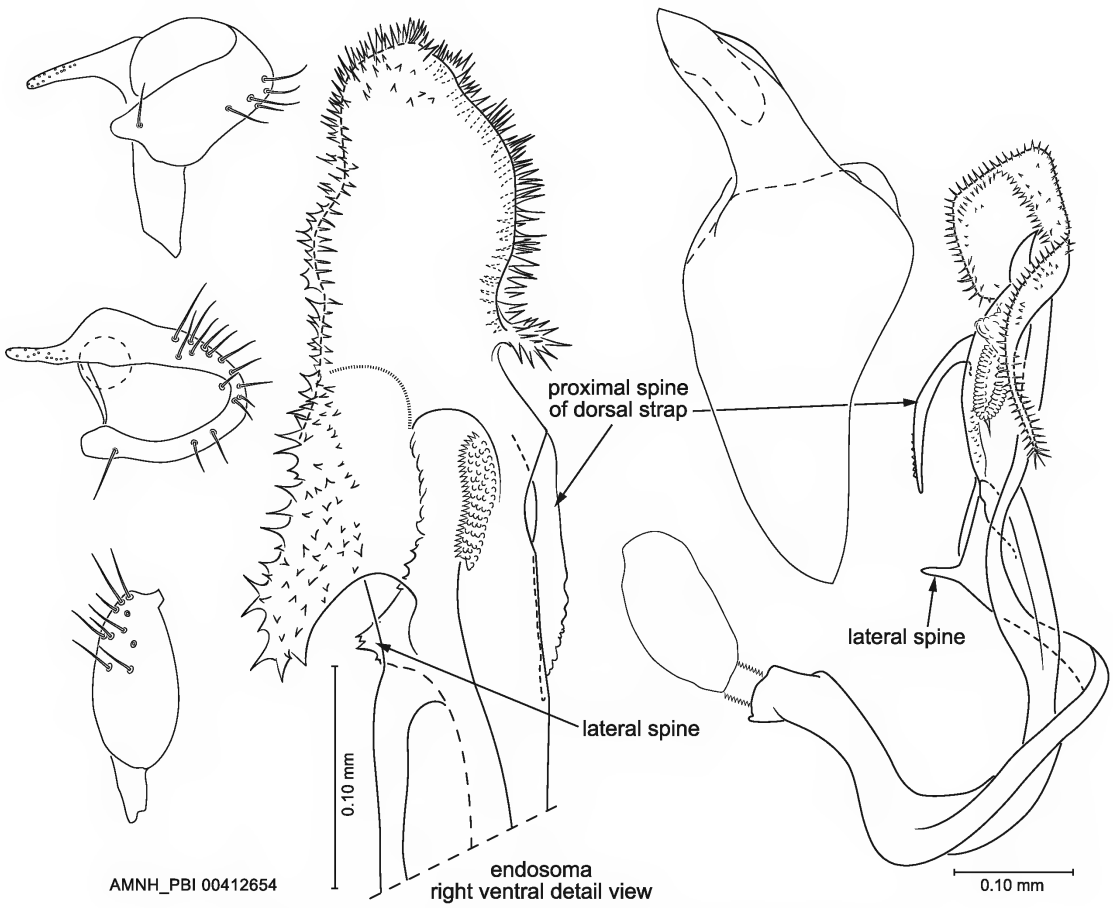


Fig. 90. Male genitalic structures of *Spinivesica tompricensis*.

times width of head; labium reaching apex of mesocoxa. **Thorax** (pl. 28): Pronotum with lateral margins nearly straight, posterior margin weakly concave; broadly moderately exposed. *Hemelytron*: Elongate, corial margin nearly straight, overall form roughly rectangular; cuneus weakly elongate. GENITALIA (fig. 90, pl. 29): **Pygophore:** As in generic description. **Endosoma:** Straps conspicuously diverging medially and merging again at level of secondary gonopore; dorsal strap at midpoint with short lateral spine proximad of secondary gonopore, subapically with one long narrow, proximally directed spine originating just distad of secondary gonopore, terminating in flattened, coarsely microtrichiate plate with undulating margin and projecting parallel with plane of endosoma; apicalmost portion of plate with edge rolled over, proximal end attenuate and extending as narrow strap proximad of secondary gonopore; ventral strap terminating in transverse sclerotized flange with serrate or smooth margin at level of secondary gonopore, sometimes flange pointed; secondary gonopore situated subapically. **Phallotheca:** Distal portion smooth, moderately sclerotized; dorsal crest well developed. **Parameres:** Left paramere with dorsoposterior margin somewhat produced posteriad. Right paramere blunt apically with point on anterior angle.

Female (pl. 28): Coloration as in male; differing from male as in generic description; mean total length 3.21, mean pronotum width 1.01.

ETYMOLOGY: Named after the Western Australian place name Tom Price.

HOSTS: Recorded from *Eremophila fraseri*, *E. phyllopoda* subsp. *obliqua*, and *E. platycalyx* subsp. *pardalota* (Scrophulariaceae).

DISTRIBUTION (map 22): Known from the area of Tom Price, Western Australia.

HOLOTYPE: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 15 km from Tom Price on WNW directed track leading to Nanutarra – Wittenoom, 22.64869°S 117.61205°E, 598 m, 27 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila phyllopoda* Chinnock *obliqua* (Scrophulariaceae), det. Perth staff PERTH 7300425, 1♂ (AMNH_PBI 0041 2655) (WAMP).

PARATYPES: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 15 km from Tom Price on WNW directed track leading to Nanutarra – Wittenoom, 22.64869°S 117.61205°E, 598 m, 27 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila phyllopoda* Chinnock *obliqua* (Scrophulariaceae), det. Perth staff PERTH 7300425, 1♂ (00389758) (AM), 5♂ (00412657–00412659, 00389748, 00389751), 13♀ (00412661–00412670, 00412673, 00412674, 00412677) (AMNH), 4♂ (00412654, 00389749, 00389750, 00389752), 4♀ (00389754–00389757) (UNSW), 3♂ (00412653, 00412656, 00412660), 8♀ (00412671, 00412672, 00412675, 00412676, 00412678–00412681) (WAMP). 23 km W of Northwest Coastal Highway, 450 m north of Southern boundary fenceline of Cane River Conservation area, 22.43541°S 115.2888°E, 74 m, 23 Jun 2011, M. Cheng & M. Elias, *Eremophila fraseri* F. Muell. (Scrophulariaceae), det. WA Herbarium, 1♂ (00387475) (UNSW). 83 km W of Tom Price on Nanutarra Rd, 22.97922°S 117.23177°E, 360 m, 28 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila platycalyx* F. Muell. *pardalota* (Scrophulariaceae), det. Perth staff PERTH 7273339, 2♂ (00389808, 00389810), 7♀ (00389814, 00389815, 00389817, 00389820–00389823) (AM), 1♀ (00389818) (AMNH), 2♂ (00389811, 00389812) (UNSW). 25 km S of Gascoyne Junction, on Towrana Homestead Rd, 25.39014°S 115.1506°E, 232 m, 04 Nov 2004, Cassis, Weirauch, Tatarnic, Symonds, *Eremophila fraseri* F. Muell. (Scrophulariaceae), det. Field ID, 2♂ (00389744, 00389745) (AMNH), 2♂ (00389746, 00389747) (WAMP).

OTHER SPECIMENS EXAMINED: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 83 km W of Tom Price on Nanutarra Rd, 22.97922°S 117.23177°E, 360 m, 28 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila platycalyx* F. Muell. *pardalota* (Scrophulariaceae), det. Perth staff PERTH 7273339, 1 nymph (00389819) (AM).

Spinivesica witchelina, new species
Figure 91, map 22, table 1, plates 28, 29

DIAGNOSIS: Recognized by the uniform yellow-orange coloration (in preserved specimen), absence of any markings on corium or membrane (pl. 28), large, J-shaped endosoma with long distal region somewhat undulating, narrow, suberect spine proximad of secondary gonopore, and terminating with diverging, bifid, truncate, spines supporting a weakly sclerotized microtrichiate plate (fig. 91, pl. 29). General appearance and coloration most similar to *S. mardathuna*, but structure of endosoma distinctive.

DESCRIPTION: *MALE*: Total length 3.36, pronotum width 1.00. COLORATION (pl. 28): Yellow-orange, including all appendages (in preserved specimens); corium and membrane without markings. SURFACE AND VESTITURE (pl. 28): Dorsum clothed with recumbent, pale, simple setae. STRUCTURE: **Head** (pl. 28): Eyes occupying three-quarters height of head; antenna inserted just above ventral margin of eye; antennal segment 2 short (0.58), 0.82 times width of head; labium reaching to midpoint of mesosternum. **Thorax** (pl. 28): Pronotum with lateral margin nearly straight, posterior margin straight; mesoscutum broadly exposed. *Hemelytron*: Short, corial margin weakly convex, overall form ovoid; cuneus short. GENITALIA (fig. 91, pl. 29): **Pygophore:** Left margin of aperture with small flange. **Endosoma:** J-shaped, large; dorsal strap forming long, slender, suberect spine proximad of secondary gonopore and terminating in bifid widely diverging truncate spines supporting medially placed flattened microtrichiate plate incorporating billowy membrane; ventral strap terminating at secondary gonopore; midpoint of dorsal strap without lateral spine; secondary gonopore apical. **Phallotheca:** Dorsal surface with short crest, aperture with undulating margin placed on anterior surface. **Parameres:** Left paramere with dorsoposterior margin greatly expanded posteriad in dorsal view, posterior

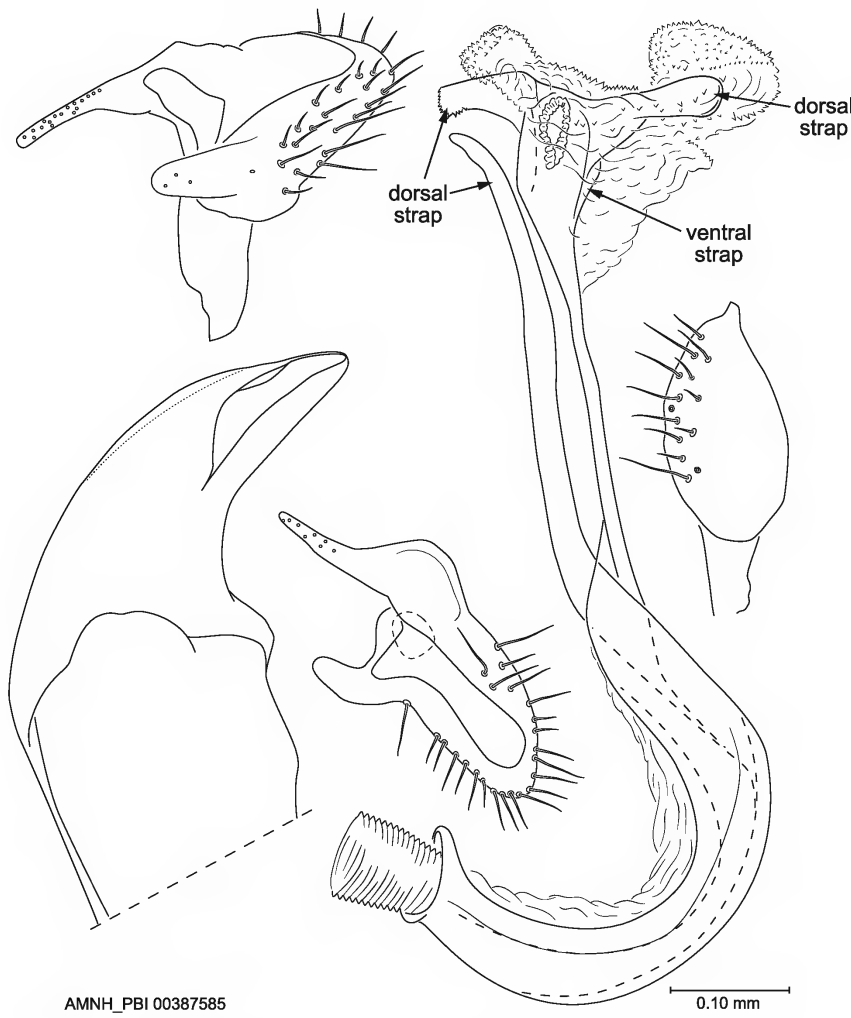


Fig. 91. Male genitalic structures of *Spinivesica witchelina*.

and anterior processes relatively large. Right paramere lanceolate, symmetrical, with small medial point.

Female: Unknown.

Etymology: Named after the Witchelina Nature Reserve, Western Australia; a noun in apposition.

Host: Unknown.

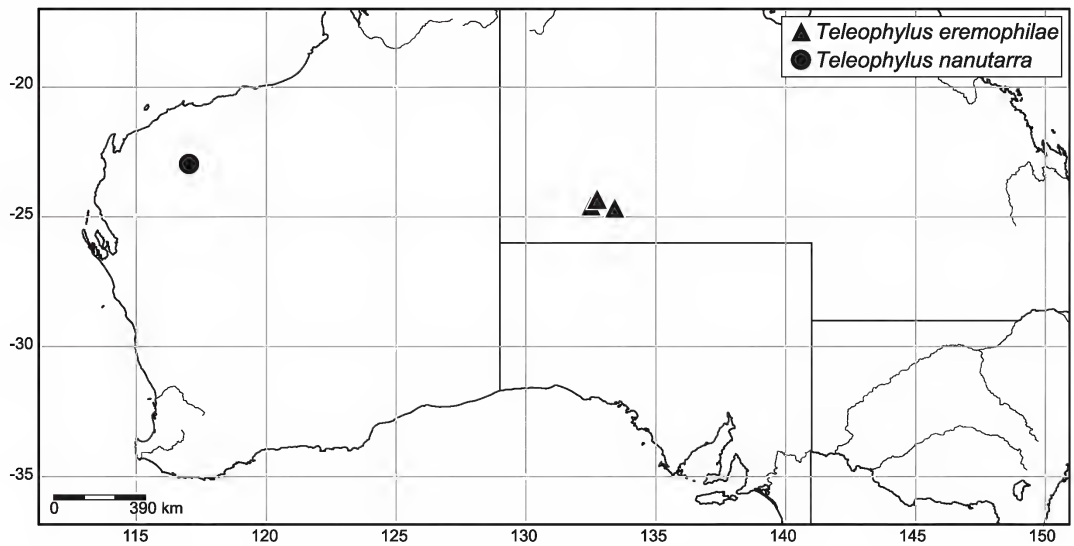
Distribution (map 22): Known only from the Witchelina Nature Reserve, about 650 km north of Adelaide, South Australia.

Holotype: **AUSTRALIA: South Australia:** Witchelina Nature Reserve, ap. 40 km NW of Lyndhurst, 29.94485°S 138.0795°E, 132 m, 11 Oct 2010, A. Namyatova, 1♂ (AMNH_PBI 00387485) (SAMA).

Telophylus, new genus

Type Species: *Telophylus eremophilae,* new species.

Diagnosis: Recognized by the elongate body, either ovoid or slender and parallel sided in both sexes, narrow vertex, bulging frons, beady eyes, antennal segment 1 black, pale or dark coloration, black pygophore, and hemelytron with contrasting dark or subtle darker spot on the inner angle of cuneus and at apex of membrane cells (pl. 30); male and female genitalia unique among Australian Cremnorrhinina with conspicuous erect, black spines on left dorsal surface of pygophore, secondary gonopore with lateral



Map 23. Distribution of *Telophylus* spp.

crest, situated at midpoint of robust, strongly sclerotized endosoma, straps bent to left at level of secondary gonopore, apical region with variably shaped microtrichiate plate(s) or tubercle, one long, narrow apically directed spine, and billowy membrane, and phallotheca with low sclerotized ridge on posterior surface (figs. 92, 93, pl. 31). Sclerotized rings asymmetrical in *Telophylus* spp. with right much smaller than left and twisted above plane of dorsal labiate plate (pl. 55A, C). Variable body form similar to *Dicyphylus* and some *Spinivesica* spp., but black bristles on pygophore, robust endosoma with medially placed, crested secondary gonopore, and absence of either a proximally directed slender spine subtending secondary gonopore or a prominent laterally directed spine distinguish *Telophylus*. Secondary gonopore in *Grandivesica cassisi* situated medially on endosoma, but that taxon without flanking crest lateral to secondary gonopore and habitus differing from *Telophylus* spp.

Description: *Male*: Total length 2.30–2.75, pronotum width 0.53–0.81. COLORATION (pl. 30): Variable, pale yellowish green or heavily infuscate, including all appendages; antennal segment 1 black, sometimes with pale apical ring; sometimes clypeus darker or vertex paler than general coloration; corium with infuscate mark adjacent to inner angle of cuneus; membrane weakly infuscate with a dark marking at apex of cells. SURFACE AND VESTITURE (pl. 30): Dorsum smooth and weakly shining. Dorsum clothed with medium length, reclining, dark, simple setae. STRUCTURE: **Head** (pl. 30): Short, transverse, conforming to anterior margin of pronotum; frons surpassing or weakly surpassing anterior margin of eyes; eyes moderately large, weakly bulging; antennal segment 2 relatively short, weakly tapered proximally. **Thorax** (pl. 30): Pronotum with lateral margins straight, anterior lobe short, calli weakly demarcated along posterior margin, posterior lobe weakly elevated, posterior margin straight, with rounded humeral angles; mesoscutum moderately exposed; scutellum flat. *Hemelytron*: Short to moderately elongate, corial margin nearly straight to weakly convex. GENITALIA (figs. 92, 93, pl. 31): **Pygophore:** Broadly conical, sometimes small; dorsal surface with field of black bristles just anterior of aperture on left dorsal surface; sometimes with dorsomedial tubercle. **Endosoma:** Well sclerotized, sigmoid, apical one-half strongly bent to left at level of secondary gonopore; apical one-half of shaft complex; subapically with variable plate

with undulate microtrichiate margin and long, narrow, sharp, apically directed spine; apically with flattened serrate plate or robust, strongly spinose spine, and billowy membrane; secondary gonopore with lateral serrate crest situated medially. **Phallotheca:** Sometimes apical portion with posterior ridge; anterior surface with aperture situated on dorsal prominence; basal portion with long, well sclerotized, internal ridge on right side. **Parameres:** Left paramere typically phyline, with variable dorsoposterior margin and anterior process. Right paramere variable in size; somewhat fusiform with medial apical spine.

Female (pl. 30: Coloration and structure as in male, except eyes somewhat smaller, costal margin of hemelytron more strongly convex, and body form more strongly ovoid; total length 2.13–2.80, pronotum width 0.78–0.83. GENITALIA (pl. 55): **Subgenital plate of sternite 6:** Concave medially. **Vestibular sclerites:** Moderately large, not reaching beyond anterior edge of dorsal labiate plate. *First gonapophyses*: Relatively small, basal spherical blocks. *Ventral labiate plate*: Shieldlike medial anteroventral extension relatively broad, surrounding anterior surface of basal structures. **Dorsal labiate plate:** Long. *Sclerotized rings*: Asymmetrical left ring large, suboval, lying coplanar to surface of dorsal labiate plate, right ring much smaller than left, triangular, obliquely situated on posterior margin of dorsal labiate plate. *Posteromedial region*: Surface without apparent microstructure. *Anterolateral region*: Projecting anteriad of sclerotized rings; right anterior margin with long oblique fracture. **Posterior wall:** *Intersegmental structure*: Concave medially. *Interramal sclerites*: Weakly sclerotized, lateral sclerites broad, attenuate dorsally, medial sclerite spherical.

Etymology: From the Greek, *telos*, "end," in reference to the placement of this taxon at the end of our publication and the generic name *Phylus*; masculine.

Discussion: Dark marking at apex of membrane cells is more obvious when the general coloration is pale.

Telophylus eremophilae, new species
Figure 92, map 23, table 1, plates 30, 55

Diagnosis: Recognized by the black pygophore contrasting with remainder of abdomen, black antennal segment 1, infuscate antennal segment 2, pale tibiae, and weak fuscous markings on corium at base of cuneus and apex of membrane cells (pl. 30); pygophore with a field of erect black spines just anterior to aperture on left side; endosoma with robust, apically directed spine arising adjacent to the secondary gonopore; apex complex, one spine with strong spicules resembling a chela, the other with microtrichia; left paramere with conspicuously produced dorsoposterior margin (fig. 92, pl. 31). Distinguished from *T. nanutarra* by general infuscation of body and appendage as well as nearly medial placement of secondary gonopore and distinct spine on gonopore in that species.

Description: *Male*: Mean total length 2.56, mean pronotum width 0.78. COLORATION (pl. 30): Pale or greenish, sometimes dirty yellow (in preserved specimens); clypeus mostly unicolorous; antennal segment 1 black with a pale apical ring, remaining segments infuscate; femora and tibiae concolorous with dorsum, devoid of distinct markings; tarsi black. SURFACE AND VESTITURE (pl. 30): Dorsum smooth, weakly polished and weakly shining; dorsum clothed with short, black, reclining, simple setae. STRUCTURE: **Head** (pl. 30): As in generic description; antennal segment 2 relatively relatively long (0.77), 1.48 times width of head. **Thorax** (pl. 30): As in generic description. *Hemelytron*: As in generic description. GENITALIA (fig. 92, pl. 31): **Pygophore:** Broadly conical, posterior margin truncate. **Endosoma:** Stout, sigmoid, basal one-half with dorsal edge serrate, distal one-half bent to left; ventral strap broadly expanded subapically terminating in long apical spine, strap distad of secondary gonopore marginally microsetose; dorsal strap bifid apically, forming one narrow smooth spine and another strongly spinose chela-shaped spine; endosoma subapically expanded with billowing membrane; secondary gonopore situated just distad of midpoint of endosoma on margin of projecting strap, with serrate crest laterad of

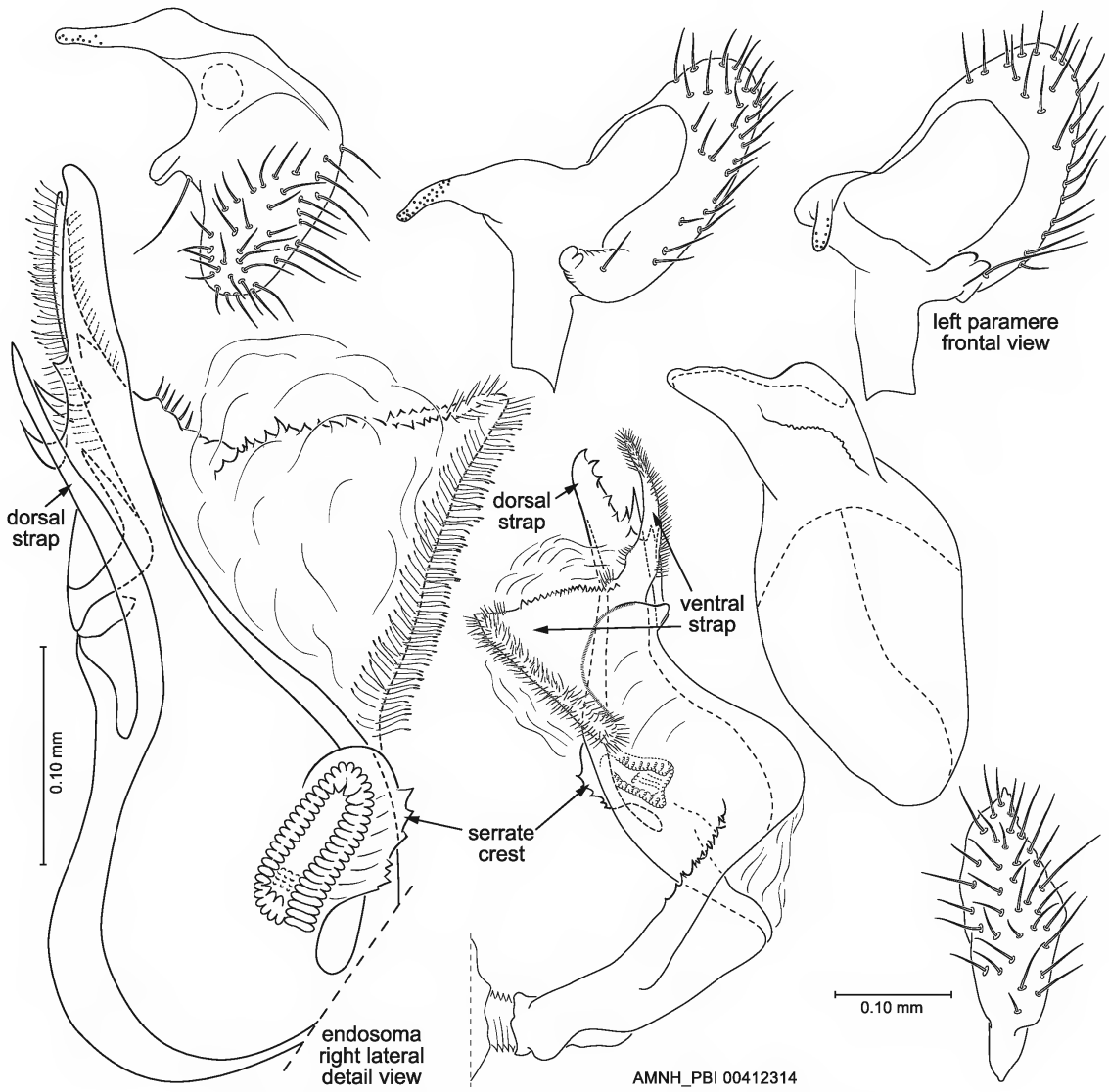


Fig. 92. Male genitalic structures of *Telophylus eremophilae*.

gonopore. **Phallotheca:** Dorsal apical surface with conspicuous marginally spiculose ridge separated from posterior edge by smooth trough; dorsal portion of anterior surface not serrate; with dorsally situated, compressed, teardrop-shaped aperture. **Parameres:** Left paramere with dorsoposterior margin very strongly projecting dorsad of posterior and anterior processes; posterior process slightly deflected; anterior process large, with cleft apex; prominent seta laterad of anterior process. Right paramere somewhat elongate with short apical projection.

Female (pl. 30): Coloration as in male; structure as in generic description; mean total length 2.66, mean pronotum width 0.80. GENITALIA as in plate 55.

Etymology: Named for *Eremophila*, host genus of this taxon.

Host: Recorded from *Eremophila willsii* and *Eremophila* sp. (Scrophulariaceae).

Distribution (map 23): Known from the Alice Springs area of Central Australia.

HOLOTYPE: **AUSTRALIA: Northern Territory:** ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666254, 1♂ (AMNH_PBI 00412304) (MNT).

PARATYPES: **AUSTRALIA: Northern Territory:** Antapiri Hill nr. Illamurta Spring, 58 km NW of Henbury Homestead, 24.28056°S 132.76389°E, 686 m, 14 May 2013, M Cheng, (Unknown), 1♂ (00414572), 1♀ (00414573) (UNSW). Henbury Station, Claypan, 20.7 km SE from Henbury Homestead, 24.63456°S 133.43717°E, 413 m, 23 May 2013, M. Cheng, *Eremophila willsii* F. Muell. (Scrophulariaceae), 2♀ (00414558, 00414585), 2♂ (00414570, 00414575) (MNT), 1♂ (00414571), 13♂ (00414556, 00414557, 00414559–00414569), 30♀ (00414574, 00414576–00414584, 00414586–00414599, 00414601–00414603, 00414605–00414607) (UNSW). ~75 km W of Stuart Hiway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Eremophila* sp. (Scrophulariaceae), det. Field ID NSW666254, 5♂ (00412305–00412309), 5♀ (00412325–00412329) (AM), 12♂ (00412297–00412300, 00412302, 00412303, 00412310–00412314, 00412749), 10♀ (00412316–00412321, 00412323, 00412324, 00412330, 00412331) (AMNH), 1♂ (00412301), 1♀ (00412322) (MNT).

Telophylus nanutarra, new species
Figure 93, map 23, table 1, plate 30

DIAGNOSIS: Recognized by the heavily infuscate body and appendages (pl. 30); endosoma heavily sclerotized, sigmoid, strongly bent to left with medially placed secondary gonopore bounded laterally by small serrate crest, subapically with broad marginally microtrichiate plate on left lateral surface, and terminally with long sharp, apically directed spine and a relatively wide, rounded, and serrate sclerite (fig. 93, pl. 31); pygophore small and broad with a minute medial tubercle anterior to aperture. Unique in its infuscate coloration and structure of endosoma, particularly the medial secondary gonopore.

DESCRIPTION: *MALE*: Mean total length 2.35, mean pronotum width 0.80. COLORATION (pl. 30): Generally heavily infuscate (fumose), including all appendages, vertex dirty green; corium without markings. SURFACE AND VESTITURE (pl. 30): Dorsum clothed with reclining, dark, simple setae. STRUCTURE: **Head** (pl. 30): Eyes occupying three-fifths height of head in lateral view; antenna inserted just above ventral margin of eye, eye weakly emarginate at insertion; antennal segment 2 short (0.44), 0.78 times width of head; labium reaching to about posterior margin of mesosternum. **Thorax** (pl. 30): Pronotum with lateral margins nearly straight, posterior margin very weakly concave; mesoscutum moderately exposed. *Hemelytron*: Short, corial margin weakly convex, overall form ovoid; cuneus short. GENITALIA (fig. 93, pl. 31): **Pygophore:** Small, broadly conical, with small pointed dorsomedial tubercle anterior to aperture. **Endosoma:** Small, well sclerotized, right-angulate at midpoint, straps proximate and parallel over three quarters of length, ventral strap terminating in sharp, smooth, apical spine; dorsal strap terminating in broad flattened plate with serrate apical margin; subapically with flattened microtrichiate plate originating from dorsal strap with curved lateral margin, extending distad as narrow ribbon on left lateral surface of endosoma; secondary gonopore medial, in interstrap region, lateral surface with several, large, sclerotized spines. **Phallotheca:** Aperture attenuate, elongate ovoid, located on dorsal edge of anterior surface; base of apical portion with small outpocket on left side. **Parameres:** Left paramere relatively small, anterodorsal margin with broad dorsal projection; posterior process medially swollen and projecting laterally in dorsal view; anterior process with broad base. Right paramere fusiform, symmetrical, apical spine medial.

Female (pl. 30): Coloration less heavily infuscate than in male, dirty green; otherwise differing from male as in generic description; mean total length 2.27, mean pronotum width 0.80.

ETYMOLOGY: From the place name Nanutarra, Western Australia, near the type locality; a noun in apposition.

HOST: Recorded from *Eremophila exilifolia* (Scrophulariaceae).

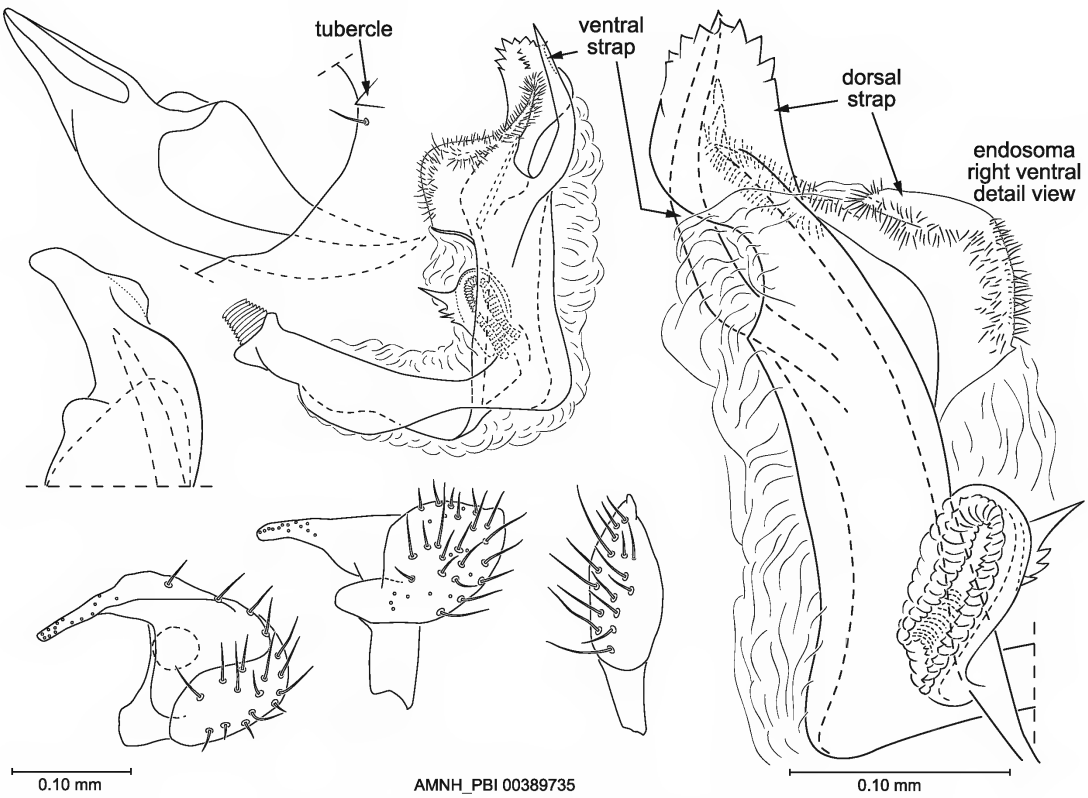


Fig. 93. Male genitalic structures of *Telophylus nanutarra*.

Distribution (map 23): Known only from the type locality west of Tom Price, Pilbara District, Western Australia.

Holotype: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 105 km W of Tom Price on Nanutarra Rd, 22.96516°S 117.02938°E, 302 m, 28 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila exilifolia* F. Muell. (Scrophulariaceae), det. Perth staff PERTH 7273312, 1♂ (AMNH_PBI 0038 9733) (WAMP).

Paratypes: **AUSTRALIA: Western Australia: *Pilbara Co.:*** 105 km W of Tom Price on Nanutarra Rd, 22.96516°S 117.02938°E, 302 m, 28 Aug 2005, G. Cassis, S. Lassau, S. and G. Carter, *Eremophila exilifolia* F. Muell. (Scrophulariaceae), det. Perth staff PERTH 7273312, 4♂ (00389732, 00389737–00389739), 1♀ (00389740) (AM), 2♂ (00389735, 00389736), 1♀ (00389742) (AMNH), 1♂ (00389734), 2♀ (00389741, 00389743) (WAMP).

GENERAL DISCUSSION

Host Associations: Tables 2–4 and figure 94 summarize data for host associations in Australian Cremnorrhinina. This approach to presenting host data allows for understanding patterns of host association as discussed in the following paragraphs.

Distribution of Australian Cremnorrhinina across plant families: Table 2 organizes host associations by plant family, provides author names for all known host plants, and indicates the number of collecting events and specimens collected for each bug species. This table makes clear the strong association of the Australian Cremnorrhinina with five families: Asteraceae, Chenopodiaceae, Myrtaceae, Proteaceae, and Scrophulariaceae. The other plant groups on which cremnorrhinines have been collected are represented by much smaller numbers of plant species and collecting events, and indeed some may be suspected of

not actually being breeding hosts. By far the largest numbers of taxa are associated with the Scrophulariaceae and particularly with the speciose genus *Eremophila*; a lesser number of taxa are known from *Myoporum*, placed in its own family (Chinnock, 2007) by some authors, but included in Scrophulariaceae in modern phylogenetically based classifications (Oxelman et al., 2005). In addition to members of the Cremnorrhinina, lesser numbers of other still-undescribed Australian Phylinae are associated with *Eremophila* as are large numbers of Tingidae species placed in multiple genera (Cassis and Symonds, 2008, 2011; Symonds and Cassis, 2013).

A broad range of chenopodiaceous genera serve as hosts for the monophyletic group *Halophylus*. Although most species of that bug genus do not appear to be host specific, they always occur on the Chenopodiaceae, a habit that is unknown for Cremnorrhinina outside of Australia, although chenopods are a well-documented host group for several assemblages of Phylinae, including for example, many members of the Nasocorini (Schuh, 2000). Myrtaceae also serves as host to a limited number of bug species belonging to a monophyletic group of cremnorrhinines, although our field data suggest that this relationship is not exclusive to the genus *Myrtophylus*, and the radiation on Myrtaceae by the Cremnorrhinina is small compared to what is seen in the *Melaleucoides* group (Exocarpocorina; Schuh and Weirauch, 2010). The Proteaceae, a large and diverse group in Australia, also serves as a host group for several species we place in the genus *Proteophylus*, with a single species of this lineage occurring on the Fabaceae.

Occupation of plant species by Australian Cremnorrhinina species: In addition to showing the distribution of bugs on a limited number of plant families, table 2 also allows for an evaluation of the numbers of bug species on a given plant taxon by comparing column 3 with column 2. The gray bars in figure 94 translate these results into a graphical result, showing that most known hosts are occupied by a single species of cremnorrhinine (142 hosts) whereas a much smaller number of hosts are occupied by 2–9 species of Cremnorrhinina.

Host specificity of Australian Cremnorrhinina species: Whereas table 2 indicates the degree to which Australian cremnorrhinines show fidelity to host families, the solid black bars in figure 94 summarize the degree of host specificity (see also table 3). These data show a similar, although less pronounced, degree of fidelity of bug species to plant species to that shown by Schuh (2002–2015) and Cassis and Schuh (2012) for Miridae host relationships in general, based on data from the literature. The available data indicate that the preponderance of known Australian cremnorrhinines occurs on a single host: 39 occurrences. A much smaller proportion occur on two (11 occurrences) or three hosts (15 occurrences), with occurrences on greater than four or more hosts being much smaller yet, with the maximum number of known hosts for a single bug species being nine.

Table 3 presents data on host specificity in tabular form. Like table 2, it also shows the numbers of specimens collected for each plant taxon as well as the number of collecting events, the last datum being the strongest indicator of confidence in host-association data. In addition, table 3 shows the distributions—by state—for each plant taxon. This table does not repeat the names of bug taxa, so that the limits of host specificity per bug species can be visualized directly from the table in addition to their graphical summary in figure 94.

Strength of data on host associations: As noted above, confidence in knowledge of host associations as understood from the examination of museum collections is best judged by the number of times (collecting events; table 4) a given bug species has been taken on a given plant species. The certainty of whether a bug species is actually associated with a given plant species or is just a sitting record in a complex floral landscape is further reinforced by the number of specimens collected on a given plant species. The nature of the data for the Australian Cremnorrhinina listed in table 3 are shown graphically by the white bars in figure 94. Here we see that 123 individual host associations are documented by a single collecting event, 28 by two collecting events, and so forth,

TABLE 2
Australian Cremnorrhinina spp. Organized by Host Plant Family and Species, with Number of Collecting Events and Specimens

Plant family	Plant species	Insect species	Ins. coll.	Insect
ACANTHACEAE	*Dicladanthera forrestii* F. Muell	*Dicyphylus beaglensis*	1	13
ASTERACEAE	*Brachyscome ciliaris* var. *lanuginosa* (Steetz) Benth.	*Dicyphylus brachyscome*	1	13
		Proteophylus grevilleae	1	10
	Chrysocephalum apiculatum (Labill.) Steetz.	*Asterophylus chrysocephali*	4	124
	Chrysocephalum eremaeum Anderb.	*Asterophylus chrysocephali*	1	56
	Chrysocephalum puteale (S.Moore) Paul G. Wilson	*Asterophylus rutidosis*	1	17
	Ixiolaena leptolepis (DC.) Benth.	*Asterophylus rutidosis*	1	56
	Leucochrysum stipitatum (F. Muell.) P.G. Wilson	*Asterophylus chrysocephali*	1	40
	Olearia axillaris (DC.) Benth.	*Halophylus chenopodos*	1	22
	Olearia sp.	*Monospiniphallus norsemanensis*	1	1
	Olearia xerophila (F. Muell.) Benth.	*Dicyphylus pilbara*	2	145
	Parthenium hysterophorus L.	*Bifidostylus omnivorus*	2	3
		Dicyphylus brachyscome	1	2
		Halophylus atriplicis	2	9
		Maculiphylus eremophilae	1	7
	Rutidosis helichrysoides DC.	*Asterophylus rutidosis*	2	68
BORAGINACEAE	*Halgania cyanea* Lindl.	*Dicyphylus halganii*	1	107
CHENOPODIACEAE		*Halophylus atriplicis*	1	40
	Arthrocnemum halocnemoides var. *pterygospermum* J.M. Black	*Halophylus tecticornii*	1	4
	Atriplex bunburyana F. Muell.	*Halophylus atriplicis*	1	3
	Atriplex nummularia Lindl.	*Halophylus atriplicis*	4	120
	Atriplex nummularia nummularia Lindl.	*Halophylus atriplicis*	1	18
	Atriplex nummularia omissa Aellen	*Halophylus atriplicis*	1	80
	Atriplex sp.	*Halophylus atriplicis*	1	37
		Halophylus chenopodos	3	1
	Chenopodium curvispicatum Paul G.Wilson	*Halophylus chenopodos*	1	3
	Enchylaena tomentosa R. Br.	*Halophylus chenopodos*	1	7
	Halosarcia halocnemoides subsp. *tenuis* Paul G.Wilson	*Halophylus tecticornii*	1	2
	Halosarcia indica (Willd.) Paul G. Wilson	*Halophylus tecticornii*	3	52
	Halosarcia indica bidens (Nees) Paul G. Wilson	*Halophylus tecticornii*	1	44
	Halosarcia pterygosperma (J.M. Black) P.G. Wilson	*Halophylus tecticornii*	1	1
	Maireana appressa Paul G. Wilson	*Halophylus maireani*	1	16
		Halophylus rhagodii	1	2
	Maireana georgei (Diels) Paul G. Wilson	*Halophylus maireani*	1	10
	Maireana oppositifolia (F. Muell.) P.G. Wilson	*Halophylus tecticornii*	1	4
	Maireana pyramidata (Benth.) Paul G. Wilson	*Halophylus maireani*	1	26
	Maireana sp.	*Halophylus chenopodos*	1	1
	Neobassia astrocarpa (F. Muell.) A.J. Scott	*Halophylus atriplicis*	1	2
	Not Determined	*Halophylus tecticornii*	2	1
	Rhagodia latifolia (Benth.) Paul G. Wilson	*Halophylus rhagodii*	3	22

TABLE 2
(Continued)

Plant family	Plant species	Insect species	Ins. coll.	Insect
	Rhagodia preissii subsp. *obovata* (Moq.) P.G. Wilson	*Halophylus rhagodii*	2	33
	Rhagodia spinescens R. Br.	*Halophylus chenopodos*	1	1
	Salsola kali L.	*Halophylus salsoli*	1	36
	Sclerolaena limbata (J. Black) Ulbr.	*Halophylus chenopodos*	1	6
		Halophylus maireani	1	6
	Sclerostegia disarticulata Paul G.Wilson	*Halophylus tecticornii*	2	200
	Tecticornia disarticulata (Paul G.Wilson) K.A. Sheph. & Paul G.Wilson	*Halophylus tecticornii*	1	1
	Tecticornia tenuis (Benth.) K.A.Sheph. & Paul G.Wilson	*Halophylus maireani*	1	8
	Threlkeldia sp.	*Halophylus chenopodos*	1	11
DILLENIACEAE	*Hibbertia cuneiformis* (Labill.) Sm.	*Eremotylus hibbertii*	1	1
	Hibbertia racemosa Enol.	*Eremotylus hibbertii*	1	4
FABACEAE	*Acacia rossei* F. Muell.	*Proteophylus acaciae*	1	47
	Acacia sp.	*Halophylus maireani*	1	1
FRANKENIACEAE	*Frankenia* sp.	*Bifidostylus silverae*	1	29
		Omnivoriphylus frankenii	1	71
GOODENIACEAE	*Goodenia ramelii* F. Muell.	*Dicyphylus scaevolae*	1	41
	Scaevola ovalifolia R. Br.	*Dicyphylus scaevolae*	2	17
LAMIACEAE	*Prostanthera campbellii* F. Muell.	*Eremotylus betoota*	1	3
LORANTHACEAE	*Amyema lucasii* (Blakely) Danser	*Bifidostylus omnivorus*	1	36
MYRTACEAE	*Aluta aspera* (E. Pritz.) Rye & Trudgen	*Myrtophylus calytrix*	3	34
	Baeckea sp.	*Myrtophylus calytrix*	1	1
	Calytrix angulata Lindl.	*Myrtophylus calytrix*	1	52
	Calytrix brevifolia (Meisn.) Benth.	*Myrtophylus calytrix*	1	57
		Pulvillophylus sp.	1	1
	Darwinia diosmoides (DC.) Benth.	*Myrtophylus calytrix*	1	1
		Myrtophylus melaleuci	1	20
	Eucalyptus populnea populnea F. Muell.	*Bifidostylus silverae*	1	6
		Proteophylus occidentalis	1	2
	Leptospermum fastigiatum S. Moore	*Myrtophylus calytrix*	1	1
	Melaleuca megacephala F. Muell.	*Myrtophylus melaleuci*	1	3
	Melaleuca sheathiana W. Fitzg.	*Bifidostylus kalgoorlie*	1	11
	Micromyrtus acuta Rye	*Myrtophylus micromyrti*	1	1
	Micromyrtus flaviflora (F. Muell.) F. Muell. ex J.M. Black	*Myrtophylus micromyrti*	1	6
	Thryptomene urceolaris F. Muell.	*Myrtophylus calytrix*	1	4
		Myrtophylus micromyrti	1	1
PROTEACEAE	*Grevillea eriostachya* Lindl.	*Proteophylus grevilleae*	5	64
	Grevillea hookeriana apiciloba (F. Muell.) R. O. Makinson	*Proteophylus grevilleae*	3	29
		Proteophylus hookeriani	3	2
		Proteophylus occidentalis	1	7
	Grevillea juncifolia Hook. subsp. *temulenta* P. Olde & N. Marriott	*Proteophylus grevilleae*	4	131
	Grevillea juncifolia subsp. *juncifolia* Hook.	*Proteophylus grevilleae*	4	58
	Grevillea paradoxa D.C.	*Proteophylus occidentalis*	1	1
	Grevillea pterosperma F. Muell.	*Proteophylus orientalis*	1	25
	Grevillea sp.	*Proteophylus grevilleae*	1	10
	Grevillea wittweri McGill.	*Proteophylus occidentalis*	1	5
	Petrophile drummondii Meisn.	*Proteophylus petrophile*	2	150

TABLE 2
(Continued)

Plant family	Plant species	Insect species	Ins. coll.	Insect
SAPINDACEAE	*Atalaya hemiglauca* (F. Muell.) F. Muell. ex Benth.	*Spinivesica crypticus*	1	4
SCROPHULARIACEAE	*Eremophila alternifolia* R.Br.	*Bifidostylus newmanensis*	1	7
	Eremophila bignoniiflora (Benth.) F. Muell.	*Monospiniphallus bignoniiflori*	1	20
	Eremophila caperata Chinnock	*Bifidostylus silverae*	1	68
		Grandivesica aurea	3	27
		Grandivesica cassisi	2	50
		Maculiphylus eremophilae	1	10
	Eremophila clarkei A.F. Oldfield & F. Muell.	*Austroplagiognathus arbustoides*	1	1
		Gyrophallus darwinensis	1	2
		Omnivoriphylus mangaensis	1	47
		Omnivoriphylus wanarra	5	1
		Spinivesica eremophiloides	2	136
	Eremophila crenulata Chinnock	*Spinivesica crenulata*	1	76
	Eremophila decipiens decipiens Ostenf.	*Grandivesica cassisi*	1	1
		Spinivesica decipiens	1	3
	Eremophila dempsteri F. Muell.	*Adunatiphylus kalbarri*	1	5
		Grandivesica cassisi	2	167
	Eremophila duttonii F. Muell.	*Bifidostylus omnivorus*	5	300
	Eremophila exilifolia F. Muell.	*Telophylus nanutarra*	1	12
	Eremophila forrestii F. Muell.	*Grandivesica pilbara*	4	12
		Gyrophallus forrestii	1	18
		Gyrophallus lochada	2	2
		Omnivoriphylus boiada	4	27
		Grandivesica pilbara	2	9
		Omnivoriphylus boiada	3	19
	Eremophila fraseri F. Muell.	*Spinivesica crenulata*	1	1
		Spinivesica mardathuna	2	7
		Spinivesica tompricensis	1	2
	Eremophila freelingii F. Muell.	*Bifidostylus cassisi*	1	145
		Bifidostylus omnivorus	1	28
		Grandivesica agnew	1	69
		Omnivoriphylus charleville	1	1
	Eremophila gilesii F. Muell.	*Bifidostylus cassisi*	2	9
	Eremophila glabra (R. Br.) Ostenf.	*Bifidostylus cassisi*	1	6
		Eremotylus glaber	1	5
		Eremotylus mosmanensis	1	72
	Eremophila glabra albicans Chinnock	*Eremotylus mosmanensis*	1	64
	Eremophila glabra tomentosa Chinnock	*Adunatiphylus kalbarri*	1	41
	Eremophila interstans Diels	*Grandivesica cassisi*	4	51
	Eremophila interstans virgata (W. Fitzg.) Chinnock	*Grandivesica cassisi*	1	17
	Eremophila ionantha Diels	*Bifidostylus finalis*	1	1
		Bifidostylus occidentalis	2	117
		Lepidophylus guttatus	1	3
	Eremophila latrobei F. Muell.	*Eremotylus betoota*	2	15
		Grandivesica pilbara	1	49
	Eremophila latrobei glabra (L.S.Sm.) Chinnock	*Eremotylus betoota*	1	3
	Eremophila latrobei latrobei F. Muell.	*Gyrophallus karara*	1	1

TABLE 2
(Continued)

Plant family	Plant species	Insect species	Ins. coll.	Insect
	Eremophila longifolia (R. Br.) F. Muell.	*Gyrophallus lasseteri*	2	3
		Spinivesica crypticus	1	1
	Eremophila macdonnellii F. Muell.	*Bifidostylus omnivorus*	1	1
		Eremotylus stuarti	1	29
	Eremophila miniata C.A. Gardner	*Grandivesica kadji*	3	27
		Gyrophallus darwinensis	1	52
		Gyrophallus symondsae	2	10
	Eremophila mitchellii Benth.	*Bifidostylus silverae*	2	41
	Eremophila oldfieldii F. Muell.	*Omnivoriphylus mangaensis*	1	22
	Eremophila oldfieldii oldfieldii F. Muell.	*Gyrophallus symondsae*	1	47
		Omnivoriphylus mangaensis	1	5
	Eremophila oppositifolia angustifolia (S. Moore) Chinnock	*Gyrophallus pantonii*	3	12
	Eremophila pantonii F. Muell.	*Gyrophallus pantonii*	1	9
	Eremophila phyllopoda obliqua Chinnock	*Grandivesica pilbara*	1	2
		Spinivesica tompricensis	1	37
	Eremophila platycalyx pardalota Chinnock	*Spinivesica pardalota*	1	2
		Spinivesica tompricensis	1	12
	Eremophila platythamnos Diels	*Grandivesica agnew*	1	37
	Eremophila platythamnos platythamnos Diels	*Bifidostylus silverae*	2	8
		Grandivesica agnew	1	13
		Grandivesica aurea	1	11
		Spinivesica eremophiloides	1	7
	Eremophila scoparia (R.Br.) F.Muell.	*Gyrophallus donggali*	1	10
		Myoporophylus carinatus	2	30
	Eremophila serrulata Druce	*Eremotylus mosmanensis*	2	8
	Eremophila setacea Chinnock	*Spinivesica spiculata*	1	4
	Eremophila sp.	*Bifidostylus omnivorus*	1	198
		Telophylus eremophilae	1	36
		Grandivesica cassisi	2	6
		Gyrophallus symondsae	1	5
		Omnivoriphylus mangaensis	1	10
		Spinivesica eremophilicola	3	120
		Spinivesica eremophiloides	2	252
	Eremophila spuria Chinnock	*Bifidostylus agnew*	1	33
		Spinivesica spiculata	1	49
	Eremophila sturtii R. Br.	*Bifidostylus gilesi*	5	69
		Bifidostylus silverae	5	222
		Eremotylus chengae	1	2
		Grandivesica aurea	2	3
		Halophylus chenopodos	1	1
		Maculiphylus eremophilae	7	27
		Spinivesica crypticus	1	1
	Myoporum platycarpum platycarpum R.Br.	*Bifidostylus gawlerensis*	2	2
		Myoporophylus grossi	3	26
	Myoporum platycarpum R. Br.	*Eremotylus mosmanensis*	1	2
		Myoporophylus grossi	4	48
SOLANACEAE	*Solanum lasiophyllum* Poir.	*Dicyphylus solani*	1	18
	Solanum sp.	*Dicyphylus brachyscome*	1	51

TABLE 3

Australian Cremnorrhinina Organized by Bug and Host spp. with Number of Collecting Events, Specimens, and Distribution by State

Insect species	Plant family	Plant species	Ins. coll. event	Insect specimens	State territory
Adunatiphylus kalbarri	Scrophulariaceae	*Eremophila dempsteri*	1	5	WA
	Scrophulariaceae	*Eremophila glabra tomentosa*	1	41	WA
Asterophylus chrysocephali	Asteraceae	*Chrysocephalum apiculatum*	4	124	NT, QLD
	Asteraceae	*Chrysocephalum eremaeum*	1	56	NT
	Asteraceae	*Leucochrysum stipitatum*	1	40	NT
Asterophylus rutidosis	Asteraceae	*Chrysocephalum puteale*	1	17	WA
	Asteraceae	*Ixiolaena leptolepis*	1	56	WA
	Asteraceae	*Rutidosis helichrysoides*	2	68	NT
Austroplagiognathus arbustoides	Scrophulariaceae	*Eremophila clarkei*	1	1	WA
Bifidostylus agnew	Scrophulariaceae	*Eremophila spuria*	1	33	WA
Bifidostylus cassisi	Scrophulariaceae	*Eremophila freelingii*	1	145	QLD
	Scrophulariaceae	*Eremophila gilesii*	2	9	NT
	Scrophulariaceae	*Eremophila glabra*	1	6	QLD
Bifidostylus finalis	Scrophulariaceae	*Eremophila ionantha*	1	1	WA
Bifidostylus gawlerensis	Scrophulariaceae	*Myoporum platycarpum platycarpum*	2	2	SA
Bifidostylus gilesi	Scrophulariaceae	*Eremophila sturtii*	5	69	NT
Bifidostylus kalgoorlie	Myrtaceae	*Melaleuca sheathiana*	1	11	WA
Bifidostylus newmanensis	Scrophulariaceae	*Eremophila alternifolia*	1	7	WA
Bifidostylus occidentalis	Scrophulariaceae	*Eremophila ionantha*	2	117	WA
Bifidostylus omnivorus	Loranthaceae	*Amyema lucasii*	1	36	NSW
	Scrophulariaceae	*Eremophila duttonii*	5	300	NT,NSW
	Scrophulariaceae	*Eremophila freelingii*	1	28	SA
	Scrophulariaceae	*Eremophila macdonnellii*	1	1	NT
	Scrophulariaceae	*Eremophila* sp.	1	198	SA
	Asteraceae	*Parthenium hysterophorus*	2	3	NT
Bifidostylus silverae	Scrophulariaceae	*Eremophila caperata*	1	68	SA
	Scrophulariaceae	*Eremophila mitchellii*	2	41	QLD
	Scrophulariaceae	*Eremophila platythamnos platythamnos*	2	8	WA
	Scrophulariaceae	*Eremophila sturtii*	5	222	SA,NSW,QLD
	Myrtaceae	*Eucalyptus populnea populnea*	1	6	QLD
	Frankeniaceae	*Frankenia* sp.	1	29	QLD
Dicyphylus beaglensis	Acanthaceae	*Dicladanthera forrestii*	1	13	WA
Dicyphylus brachyscome	Asteraceae	*Brachyscome ciliaris* var. *lanuginosa*	1	13	NT
	Asteraceae	*Parthenium hysterophorus*	1	2	NT
	Solanaceae	*Solanum* sp.	1	51	NT
Dicyphylus halganii	Boraginaceae	*Halgania cyanea*	1	107	WA
Dicyphylus pilbara	Asteraceae	*Olearia xerophila*	2	145	WA
Dicyphylus scaevolae	Goodeniaceae	*Goodenia ramelii*	1	41	WA
	Goodeniaceae	*Scaevola ovalifolia*	2	17	NT
Dicyphylus solani	Solanaceae	*Solanum lasiophyllum*	1	18	WA
Eremotylus betoota	Lamiaceae	*Prostanthera campbellii*	1	3	WA
	Scrophulariaceae	*Eremophila latrobei*	2	15	QLD,NT
	Scrophulariaceae	*Eremophila latrobei glabra*	1	3	NT
Eremotylus chengae	Scrophulariaceae	*Eremophila sturtii*	1	2	NT

TABLE 3
(Continued)

Insect species	Plant family	Plant species	Ins. coll. event	Insect specimens	State territory
Eremotylus glaber	Scrophulariaceae	*Eremophila glabra*	1	5	QLD
Eremotylus hibbertii	Dilleniaceae	*Hibbertia cuneiformis*	1	1	WA
	Dilleniaceae	*Hibbertia racemosa*	1	4	WA
Eremotylus mosmanensis	Scrophulariaceae	*Eremophila glabra*	1	72	WA
	Scrophulariaceae	*Eremophila glabra albicans*	1	64	WA
	Scrophulariaceae	*Eremophila serrulata*	2	8	WA
	Scrophulariaceae	*Myoporum platycarpum*	1	2	SA
Eremotylus stuarti	Scrophulariaceae	*Eremophila macdonnellii*	1	29	NT
Grandivesica agnew	Scrophulariaceae	*Eremophila freelingii*	1	69	QLD
	Scrophulariaceae	*Eremophila platythamnos*	1	37	WA
	Scrophulariaceae	*Eremophila platythamnos platythamnos*	1	13	WA
Grandivesica aurea	Scrophulariaceae	*Eremophila caperata*	3	27	WA,SA
	Scrophulariaceae	*Eremophila platythamnos platythamnos*	1	11	WA
	Scrophulariaceae	*Eremophila sturtii*	2	3	SA
Grandivesica cassisi	Scrophulariaceae	*Eremophila caperata*	2	50	WA
	Scrophulariaceae	*Eremophila decipiens decipiens*	1	1	WA
	Scrophulariaceae	*Eremophila dempsteri*	2	167	WA
	Scrophulariaceae	*Eremophila interstans*	4	51	WA
	Scrophulariaceae	*Eremophila interstans virgata*	1	17	WA
	Scrophulariaceae	*Eremophila* sp.	2	6	WA
Grandivesica kadji	Scrophulariaceae	*Eremophila miniata*	3	27	WA
Grandivesica pilbara	Scrophulariaceae	*Eremophila forrestii*	4	12	WA
	Scrophulariaceae	*Eremophila forrestii forrestii*	2	9	WA
	Scrophulariaceae	*Eremophila latrobei*	1	49	WA
	Scrophulariaceae	*Eremophila phyllopoda obliqua*	1	2	WA
Gyrophallus darwinensis	Scrophulariaceae	*Eremophila clarkei*	1	2	WA
	Scrophulariaceae	*Eremophila miniata*	2	52	WA
Gyrophallus donggali	Scrophulariaceae	*Eremophila scoparia*	1	10	SA
Gyrophallus forrestii	Scrophulariaceae	*Eremophila forrestii*	2	18	WA
Gyrophallus karara	Scrophulariaceae	*Eremophila latrobei latrobei*	1	1	WA
Gyrophallus lasseteri	Scrophulariaceae	*Eremophila longifolia*	2	3	NT,SA
Gyrophallus lochada	Scrophulariaceae	*Eremophila forrestii*	1	2	WA
Gyrophallus pantonii	Scrophulariaceae	*Eremophila oppositifolia angustifolia*	3	12	WA
	Scrophulariaceae	*Eremophila pantonii*	1	9	WA
Gyrophallus symondsae	Scrophulariaceae	*Eremophila miniata*	1	10	WA
	Scrophulariaceae	*Eremophila oldfieldii oldfieldii*	1	47	WA
	Scrophulariaceae	*Eremophila* sp.	1	5	WA
Halophylus atriplicis	Chenopodiaceae	*Atriplex bunburyana*	1	3	WA
	Chenopodiaceae	*Atriplex nummularia*	4	120	SA,NSW,NT
	Chenopodiaceae	*Atriplex nummularia nummularia*	1	18	NT
	Chenopodiaceae	*Atriplex nummularia omissa*	1	80	NSW
	Chenopodiaceae	*Atriplex* sp.	3	37	WA,VIC
	Chenopodiaceae	*Neobassia astrocarpa*	1	2	WA
	Chenopodiaceae	Not determined	2	40	SA
	Asteraceae	*Parthenium hysterophorus*	2	9	SA,NT
Halophylus chenopodos	Chenopodiaceae	*Atriplex* sp.	1	1	SA
	Chenopodiaceae	*Chenopodium curvispicatum*	1	3	NSW
	Chenopodiaceae	*Enchylaena tomentosa*	1	7	WA

TABLE 3
(Continued)

Insect species	Plant family	Plant species	Ins. coll. event	Insect specimens	State territory
	Chenopodiaceae	*Maireana* sp.	1	1	SA
	Asteraceae	*Olearia axillaris*	1	22	WA
	Chenopodiaceae	*Rhagodia spinescens*	1	1	NT
	Chenopodiaceae	*Sclerolaena limbata*	1	6	SA
	Chenopodiaceae	*Threlkeldia* sp.	1	11	WA
Halophylus maireani	Chenopodiaceae	*Maireana appressa*	1	16	SA
	Chenopodiaceae	*Maireana georgei*	1	10	WA
	Chenopodiaceae	*Maireana pyramidata*	1	26	WA
	Chenopodiaceae	*Sclerolaena limbata*	1	6	SA
	Chenopodiaceae	*Tecticornia tenuis*	1	8	NT
Halophylus rhagodii	Chenopodiaceae	*Maireana appressa*	1	2	SA
	Chenopodiaceae	*Rhagodia latifolia*	3	22	WA
	Chenopodiaceae	*Rhagodia preissii* subsp. *obovata*	2	33	WA
Halophylus salsoli	Chenopodiaceae	*Salsola kali*	1	36	SA
Halophylus tecticornii	Chenopodiaceae	*Arthrocnemum halocnemoides* var. *pterygospermum*	1	4	WA
	Chenopodiaceae	*Halosarcia halocnemoides* subsp. *tenuis*	1	2	WA
	Chenopodiaceae	*Halosarcia indica*	3	52	WA,VIC
	Chenopodiaceae	*Halosarcia indica bidens*	1	44	WA
	Chenopodiaceae	*Halosarcia pterygosperma*	1	1	WA
	Chenopodiaceae	*Maireana oppositifolia*	1	4	WA
	Chenopodiaceae	Not Determined	1	1	VIC
	Chenopodiaceae	*Sclerostegia disarticulata*	2	200	SA
	Chenopodiaceae	*Tecticornia disarticulata*	1	1	WA
Lepidophylus guttatus	Scrophulariaceae	*Eremophila ionantha*	1	3	WA
Maculiphylus eremophilae	Scrophulariaceae	*Eremophila caperata*	1	10	SA
	Scrophulariaceae	*Eremophila sturtii*	7	27	SA,NSW,NT
	Asteraceae	*Parthenium hysterophorus*	1	7	NSW
Monospinophylus bignoniiflori	Scrophulariaceae	*Eremophila bignoniiflora*	1	20	QLD
Monospinophylus norsemanensis	Asteraceae	*Olearia* sp.	1	1	WA
Myoporophylus carinatus	Scrophulariaceae	*Eremophila scoparia*	2	30	WA,SA
Myoporophylus grossi	Scrophulariaceae	*Myoporum platycarpum platycarpum*	3	26	SA
	Scrophulariaceae	*Myoporum platycarpum*	4	48	SA
Myrtophylus calytrix	Myrtaceae	*Aluta aspera*	3	34	WA
	Myrtaceae	*Baeckea* sp.	1	1	WA
	Myrtaceae	*Calytrix angulata*	1	52	WA
	Myrtaceae	*Calytrix brevifolia*	1	57	WA
	Myrtaceae	*Darwinia diosmoides*	1	1	WA
	Myrtaceae	*Leptospermum fastigiatum*	1	1	WA
	Myrtaceae	*Thryptomene urceolaris*	1	4	WA
Myrtophylus melaleuci	Myrtaceae	*Darwinia diosmoides*	1	20	WA
	Myrtaceae	*Melaleuca megacephala*	1	3	WA
Myrtophylus micromyrti	Myrtaceae	*Micromyrtus acuta*	1	1	WA
	Myrtaceae	*Micromyrtus flaviflora*	1	6	NT
	Myrtaceae	*Thryptomene urceolaris*	1	1	WA
Omnivoriphylus boiada	Scrophulariaceae	*Eremophila forrestii*	4	27	WA
	Scrophulariaceae	*Eremophila forrestii forrestii*	3	19	WA

TABLE 3
(Continued)

Insect species	Plant family	Plant species	Ins. coll. event	Insect specimens	State territory
Omnivoriphylus charleville	Scrophulariaceae	*Eremophila freelingii*	1	1	QLD
Omnivoriphylus frankenii	Frankeniaceae	*Frankenia* sp.	1	71	QLD
Omnivoriphylus mangaensis	Scrophulariaceae	*Eremophila clarkei*	5	47	WA
	Scrophulariaceae	*Eremophila oldfieldii*	1	22	WA
	Scrophulariaceae	*Eremophila oldfieldii oldfieldii*	1	5	WA
	Scrophulariaceae	*Eremophila* sp.	1	10	WA
Omnivoriphylus wanarra	Scrophulariaceae	*Eremophila clarkei*	1	1	WA
Proteophylus acaciae	Fabaceae	*Acacia rossei*	1	47	WA
Proteophylus grevilleae	Proteaceae	*Grevillea eriostachya*	5	64	NT,WA
	Proteaceae	*Grevillea hookeriana apiciloba*	3	29	WA
	Proteaceae	*Grevillea juncifolia* subsp. *temulenta*	4	131	NT
	Proteaceae	*Grevillea juncifolia* subsp. *juncifolia*	4	58	NT
	Proteaceae	*Grevillea* sp.	1	10	SA
Proteophylus hookeriani	Proteaceae	*Grevillea hookeriana apiciloba*	1	2	WA
Proteophylus occidentalis	Proteaceae	*Grevillea hookeriana apiciloba*	3	7	WA
	Proteaceae	*Grevillea paradoxa*	1	1	WA
	Proteaceae	*Grevillea wittweri*	1	5	WA
Proteophylus orientalis	Proteaceae	*Grevillea pterosperma*	1	25	SA
Proteophylus petrophile	Proteaceae	*Petrophile drummondii*	2	150	WA
Pulvillophylus sp.	Myrtaceae	*Calytrix brevifolia*	1	1	WA
Spinivesica crenulata	Scrophulariaceae	*Eremophila crenulata*	1	76	WA
	Scrophulariaceae	*Eremophila fraseri*	1	1	WA
Spinivesica crypticus	Sapindaceae	*Atalaya hemiglauca*	1	4	NT
	Scrophulariaceae	*Eremophila longifolia*	1	1	NT
	Scrophulariaceae	*Eremophila sturtii*	1	1	NT
Spinivesica decipiens	Scrophulariaceae	*Eremophila decipiens*	1	3	WA
Spinivesica eremophilicola	Scrophulariaceae	*Eremophila* sp.	3	120	NT
Spinivesica eremophiloides	Scrophulariaceae	*Eremophila clarkei*	2	136	WA
	Scrophulariaceae	*Eremophila platythamnos platythamnos*	1	7	WA
	Scrophulariaceae	*Eremophila* sp.	2	252	NT
Spinivesica mardathuna	Scrophulariaceae	*Eremophila fraseri*	1	7	WA
Spinivesica pardalota	Scrophulariaceae	*Eremophila platycalyx pardalota*	1	2	WA
Spinivesica spiculata	Scrophulariaceae	*Eremophila setacea*	1	4	WA
	Scrophulariaceae	*Eremophila spuria*	1	49	WA
Spinivesica tompricensis	Scrophulariaceae	*Eremophila fraseri*	2	2	WA
	Scrophulariaceae	*Eremophila phyllopoda obliqua*	1	37	WA
	Scrophulariaceae	*Eremophila platycalyx pardalota*	1	12	WA
Telophylus eremophilae	Scrophulariaceae	*Eremophila* sp.	1	36	NT
Telophylus nanutarra	Scrophulariaceae	*Eremophila exilifolia*	1	12	WA

TABLE 4
Australian Cremnorrhinina: Number of Hosts and Collecting Events by State

State (s)	# hosts	# coll events
NSW	5	5
NT	28	45
NT, QLD	2	6
NT, NSW	1	5
NT, SA	2	2
NT, WA	1	5
QLD	10	11
SA	25	34
SA,NSW,NT	2	11
SA,NSW,QLD	1	5
VIC	1	1
WA	105	146
WA, SA	2	5
WA, VIC	2	6
TOTAL	**187**	**289**

TABLE 5
Distribution of Australian Cremnorrhinina by State

State (s)	# spp.	
NT	7	
NT, QLD	1	
SA, NT	2	
QLD	4	
SA	5	
SA, NSW, NT	1	
SA, NSW, VIC	1	*H. salsoli*
SA, QLD	1	
WA	42	
WA, NT	3	
WA, QLD	1	
WA, SA	6	*H. rhagodii*
WA, SA, NT	3	*H. maireani*
WA, SA, NSW	1	
WA, SA, QLD, NT, NSW	1	*H. chenopodos*
WA, SA, VIC	1	*H. tecticornii*
WA, SA, NSW, NT	1	
WA, SA, NT, NSW, VIC	1	*H. atriplicis*
WA, SA, NSW, QLD	1	
WA, QLD, NT	2	
TOTAL	**85**	

up to a maximum of seven collecting events for a single host association. Thus, the preponderance of known associations is documented through a single collecting event indicating that concepts of host restrictedness will be rigorously tested only through the acquisition of host data from additional collecting events.

Host associations of Cremnorrhinina outside Australia: Below we present a summary of host associations for non-Australian cremnorrhinines derived from data for 396 collecting events involving more than 4700 specimens, these data having been captured by the U.S. National Science Foundation funded Plant Bug Planetary Biodiversity Inventory and the Tri-Trophic Thematic Collections Network projects and from the On-Line Systematic Catalog of Plant Bugs (Schuh, 2002–2015). Because many of these records are based on single specimens from single collecting events, our summary is based on data filtered to include only those records including data for more than three specimens, with the result being a set of 159 records. We offer the following comments in an attempt to summarize data for those host families for which the data offer credible host information.

Asteraceae: This is the only plant family that shares multiple host records within and outside Australia, and serves as breeding hosts for a number of North American *Macrotylus* spp. as well as three species from the Palearctic (Schuh, 2002–2015). Among Australian cremnorrhinines, only *Asterophylus* is known to feed on Asteraceae.

Fabaceae: Particularly species placed in the genera *Dalea* and *Lupinus* in North America serve as the apparent hosts of several species placed in the genus *Coquillettia* Uhler, among a few others. *Proteophylus acaciae* is the only Australian cremnorrhinine known to feed on the Fabaceae.

Geraniaceae: Of the three groups of Cremnorrhinina known from South Africa, one involving two or three undescribed species is known only from the speciose genus *Pelargonium* in this family. No taxa outside of South Africa are recorded from the Geraniaceae.

Grossulariaceae: The Nearctic genus *Pronotocrepis* Knight is known to feed only on the genus *Ribes* Linnaeus.

Lamiaceae: Mints serve as hosts for at least three North American *Macrotylus* spp. based specimen data, but for only one Palearctic

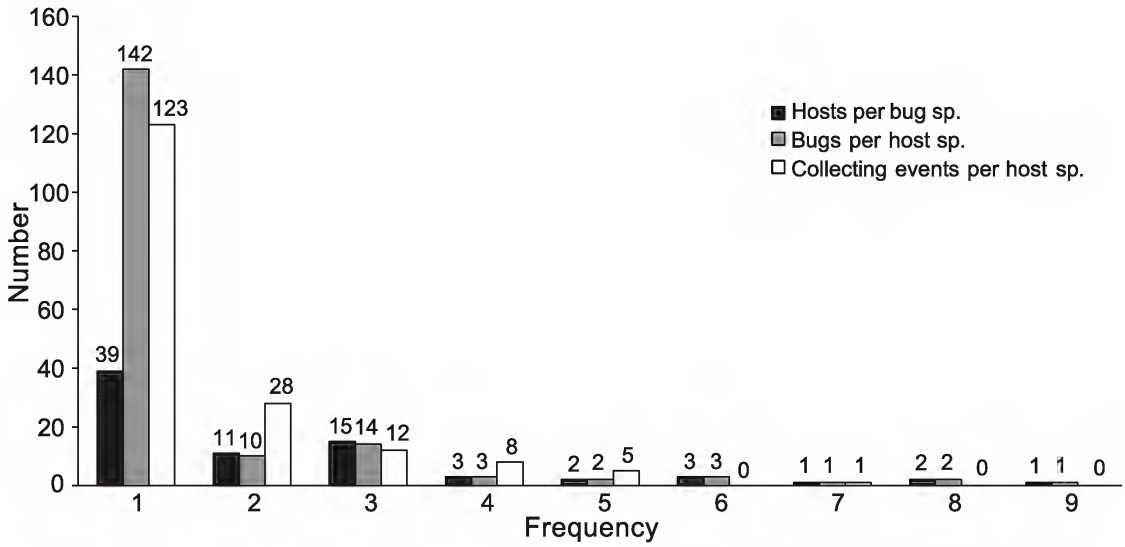


Fig. 94. Histograms showing frequencies of association of Australian Cremnorrhinina and their hosts.

species based on data available to us. Nonetheless, the literature provides a list of at least 23 species from the Palearctic that have been recorded on Lamiaceae (Schuh, 2002–2015). A single species from South Africa, *Macrotylus hemizygiae* Schuh, is also known from the Lamiaceae (Schuh, 1974). The order Lamiales is the single largest host group for the Australian cremnorrhinine fauna, nearly all on the family Scrophulariaceae (*Eremophila*, *Myoporum*), with only *Eremotylus betoota* recorded as having Lamiaceae as a host group.

Poaceae: Grasses are known hosts for *Amblytylus* spp. and at least some species that have been placed in the genus *Lopus* Hahn (Schuh, 2002–2015). Nonetheless, specimen data indicate that both of these genera have been collected on other plant taxa as well, although we surmise that these are not breeding records.

Rhamnaceae: Specimen data indicate that several species of the genus *Ceanothus* in Western North America have been consistently recorded as the host of *Teleorhinus cyaneus* Uhler.

Rosaceae: This diverse Northern Hemisphere plant group serves as the recorded host for multiple cremnorrhinines. The Holarctic genus *Potentilla* is recorded as the host of *Macrotylus* spp. from the Palearctic and for *Dacota hesperia* Uhler from the Holarctic. *Spiraea hypericifolia* is the recorded host for *Ethelastia liturata* (Fieber) from the Palearctic, and *Purshia* spp. have been recorded as hosts for *Orectoderus* Uhler and *Teleorhinus* Uhler spp.

Rutaceae: At least three genera of native Rutaceae are recorded as hosts for the genus *Denticulophallus* Schuh from the Southwest Cape region of South Africa, these bug species being known from no other host group (see Schuh, 1974).

Cassis and Schuh (2012) pointed out that the large and diverse Asterid and Rosid clades serve as hosts for the preponderance of mirid taxa. There is a large component of Arsterid feeders in the Australian fauna, including those on the Asterales and Lamiales and both of these groups are occupied by cremnorrhinines outside Australia, but without the lopsided concentration on Lamiales as seen in Australia. Cremnorrhinines within and outside Australia occupy a limited number of Rosid orders, although there seems to be no overlap at the family level. For other groups such as the Monocotoledoneae and Proteales there appears to be no sharing of associations

between the Australian fauna and the rest of the world. Detecting patterns of coevolutionary association on these and other plant groups in the absence of a detailed phylogenetic hypothesis for the Cremnorrhinina would appear to be totally speculative at this point.

Distributions within Australia:

As has been shown in previous studies (Weirauch, 2007; Schuh and Pedraza, 2010; Schuh and Weirauch, 2010) the greatest diversity in some groups of Australian exocarpocorine Phylinae occurs in Western Australia, and as known from the western portions of those states. All records from Victoria are from the most desertic areas of the state and no taxa have been recorded from Tasmania. Nearly half (42) of all the described species are known only from Western Australia, with the next highest numbers of species by state being from the Northern Territory (7), South Australia (5), and Queensland (4). The first two states also share two taxa in common. Western Australia shares three species in common with the Northern Territory, six species are shared between Western Australia and South Australia, and three species are shared between all three of these states. Much smaller numbers of species are involved in other sharing patterns. All six species of *Halophylus* show the most widespread distributions in table 5, each of these occurring over much of the continent and on a much wider range of host taxa, albeit all belonging to the Chenopodiaceae, than is seen in most other Australian cremnorrhinines.

At the generic level, most taxa are widespread, allowing for the fact that three of the recognized genera are monotypic.

A recent study by Rix et al. (2014) summarized a large body of information on biogeographic patterns involving Western Australia. These may be helpful in providing some mechanistic explanations for patterns seen in phyline Miridae. On the largest scale the frequently seen distributional disjunction between Western Australia and South Australia may well be explained by what Rix et al. (2014) refer to as the Nullarbor divide, a Neogene marine incursion forming what is now the Nullarbor Plain. A few taxa cross this divide (e.g., *Myoporophylus* spp.), whereas most species that achieve wider distributions across its northern margin, such as taxa known from the Gold Fields and Central Australia, and in some cases also including western Queensland. All but one species of *Halophylus* seem to defy the Nullarbor divide and show much more widespread distributions without obvious disjunctions.

Rix et al. (2014) emphasized the need for information of ages of origin, phylogenetic relationships, and population divergence. In the Cremnorrhinina none of these data are currently available, which limits our ability to test detailed biogeographic theories. Another factor that also limits testing and deduction is the low number of collecting events for most taxa, with over half of known species (43) known from a single collecting event. This deficiency is further magnified by the geographic sampling bias, existing collections being restricted to those areas that are readily accessible by road. Thus, nearly the entirety of the Nullarbor Plain region is unknown as far as Miridae are concerned, because there are relatively few roads in it and large tracts are otherwise restricted to travel, all of this in addition to the fact that the region appears barren to the eye.

Phylogenetic and Biogeographic Connections outside Australia:

One might then ask, what are the connections of the Australian Cremnorrhinina outside the continent?

We might first wish to address the issue of whether the Australian fauna represents a monophyletic group. As indicated in the introduction and the subtribal diagnosis, the salient character of the Cremnorrhinina is the structure of the pretarsus, particularly the elongate pulvilli. Although the taxa Wyniger (2010) assigned to the Holarctic assemblage Pronotocrepini have pulvilli adnate to the entire ventral surface of the claw, to our knowledge all other taxa have free pulvilli extending to near the apex of the claw. Outside Australia most taxa placed in the tribe have at least a prominent clypeus, and often the head (face) extends well beyond the

anterior margin of the compound eyes. This latter feature exists in only a few Australian species, all belonging to the genus *Pulvillophylus*, whereas in all other Australian taxa the head is short, relatively broad, and not produced anteriorly. The virtually monotonous nature of head structure in the Australian fauna is pointed out in our subtribal diagnosis and is reinforced by the measurement data as presented in the species descriptions. Most species of *Macrotylus* from the Northern Hemisphere have the claws strongly toothed basally (Schwartz and Scudder, 2003, figs. 16E, 17C, D), an attribute not seen in any Australian Cremnorrhinina.

While it has been suggested by Schuh and Menard (2013) on the basis of pretarsal structure, and documented in the combined morphological/molecular analysis of Menard et al. (2014), that the Cremnorrhinina are a monophyletic group, no further commentary exists in the literature on the subject. Thus, in order to better address the issue of monophyly of the Australian fauna, we will make some observations on other aspects of morphology in the group, particularly the male genitalia.

Published studies, and some unpublished work, indicate that some members of the Cremnorrhinina have a rather simple, strongly sclerotized, C- or J-shaped endosoma, usually with a single apical spine. This type is seen in many genera, including *Callidroides* Schwartz and *Strophopoda* Van Duzee (Schwartz, 2005), *Coquillettia* Uhler (Wyniger, 2012), *Ethelastia*, *Orectoderus*, *Pronotocrepis*, *Teleorhinus* (Wyniger, 2010), and *Dacota* (Kerzhner, 1988). This genitalic type resembles that of *Halophylus* and *Pulvillophylus*—genera that appear to be closely related to one another on the basis of a large number of attributes—in general shape and degree of sclerotization. *Guentherocoris* Schuh and Schwartz (2004), most species placed in *Macrotylus*, and undescribed *Pelargonium* feeders from South Africa have a less heavily sclerotized endosoma with two distinct straps and one or two apical spines, a structural type more similar to the remaining Australian genera. The endosoma in the genus *Denticulophallus* Schuh (1974) from South Africa appears to be structurally different from many other Cremnorrhinina, but we postulate that these differences are superficial and that the dentate apex of the endosoma is just an elaborate version of much smaller denticles seen in a variety of other taxa within the Cremnorrhinina.

Our studies on the Australian fauna bring together in a unified fashion the most detailed information on male genitalia in the Cremnorrhinina. It is our assessment that this documentation shows that the fauna represents a monophyletic group, but with greater structural diversity of the endosoma than seen in all other members of the subtribe. This diversity is manifested in the spiculate baglike structures associated with the apex of the endosoma in *Grandivesica*, *Gyrophallus* and *Spinivesica*, and the supernumerary endosomal spines seen in *Dicyphylus*, *Gyrophallus*, *Myrtophylus*, and *Spinivesica*. We hypothesize that this structural diversity, not seen outside Australia, is autapomorphic, and that the spines in particular can be analogized with spines that appear de novo in other groups of Phylinae, including *Pilophorus* Hahn (Schuh, 1991), *Phymatopsallus* Knight (Schuh, 2006), and the Exocarpocorina in Australia, for example.

Thus, whereas we interpret the existing data to suggest that the Cremnorrhinina, including those from Australia, form a monophyletic group (fig. 1), and that those within Australia are most probably a monophyletic group, it is not clear how to phylogenetically best connect Australia to the rest of the world, notwithstanding the information presented in figure 1. In the Leucophoropterini and Pilophorini there are obvious biogeographic connections with Asia, the details of which have recently been documented in detail by Menard and Schuh (2011) and Menard and Woolley (2014). This does not appear to be the case for the Cremnorrhinina as no taxa have been recorded from mainland Asia or the intervening archipelagos (e.g., Schuh, 1984).

Transantarctic connections have been postulated by Weirauch and Schuh (2011) for the Exocarpocorina to include Australia + New Zealand + Chile - Argentina, but we see no evidence for this pattern in the Cremnorrhinina, because there are no known members of the group in South America and nearly all remaining cremnorrhinines occur in the Northern Hemisphere or South Africa. South Africa

offers a potential connection, but under most biogeographic theories its connection to Australia almost certainly antedates the origins of most groups of Miridae. Nonetheless, the sister group of the Cremnorrhinina is the Coatonocapsina (Menard et al., 2014), which appears to show its greatest diversity in South Africa. No Cremnorrhinina were recorded from Ethiopian Africa by Poppius (1914) or Linnavuori (1975) although examination of existing collections by us indicates the presence of *Macrotylus* species from East Africa, in addition to those described by Schuh (1974) from South Africa.

At the present time we lack any corroborated concept of age of origin for the Cremnorrhinina. Absent such information it is difficult to postulate the age of biotic connections based on the Cremnorrhinina within Australia.

ACKNOWLEDGMENTS

We thank Gerry Cassis for his contributions to our fieldwork in Australia, including fund raising and logistics. Gerry collected many of the specimens used in this study, during his time at the Australian Museum and more recently at the University of New South Wales. "Bush Blitz" expeditions by Gerry and his students at the university have contributed especially to our knowledge of taxa feeding on the speciose Australian genus *Eremophila*. We thank Celia Symonds, University of New South Wales, for assembling and shipping the Bush Blitz material for inclusion in our study.

The following individuals made contributions that were indispensable in bringing this project to completion: Christiane Weirauch, then a NSF-PBI–funded postdoc at the AMNH, sorted, dissected, and organized a significant portion of the material examined during the course of this study. Her initial illustrations of the endosoma, habitus photographs, and provisional generic groupings all facilitated our ability to create the classificatory framework presented here. Steve Thurston, AMNH, prepared the digital habitus images, the digital renderings of genitalic illustrations, and assembled all the illustrations presented in this paper. Ruth Salas, AMNH, captured the preponderance of the specimen data in the Arthropod Easy Capture Database, prepared the specimen measurements, and prepared the scanning electron micrographs. The sheer volume of work speaks forcefully about the dedication and skill of each of these valued colleagues.

Katja Seltmann (AMNH) wrote the data-extraction scripts and offered valuable advice concerning the organization of host data as presented in tables 2–4. Jean Francois Landry, Agriculture and Agri-Food Canada, Ottawa made available a Nikon Eclipse E800 photomicrographic system and Vazrick Nazari assisted in the use of that system in preparing the images of the endosomae.

We thank those institutions and curators who generously loaned specimens studied during the course of this project. Detailed information is presented under Materials and Methods.

We thank the relevant authorities from Western Australia, South Australia, Queensland, New South Wales, Victoria, and the Northern Territory for the issuance of collecting permits. We thank the staffs of the Western Australian Herbarium and the Royal Botanic Garden, Sydney, for the identification of plant host vouchers; without their efforts our knowledge of the biotic associations of this group of insects would be grossly inferior to what we are able to present.

We also thank Mary Knight, editor, AMNH Scientific Publications, for her scholarly advice and suggestions on the formation of scientific names derived from classical languages.

This project was supported in part by a Planetary Biodiversity Inventories award (DEB 0316495) from the United States National Science Foundation, including development of the Arthropod Easy Capture database, the postdoc of C. Weirauch, fieldwork conducted by G. Cassis, M.D.S., and C. Weirauch in 2004, and mounting, labeling, and sorting of collections used in this study. Additional funding for fieldwork was provided by the Australian Museum, the AMNH, the Niarchos Foundation via the AMNH, and the National Geographic Society. Enhancements to the Arthropod Easy Capture Database that benefited this project were funded through NSF ADBC-TCN award (EF-1115080) to the AMNH. To all of these organizations we offer our sincere thanks for their generous support.

REFERENCES

Carvalho, J.C.M. 1952. On the major classification of the Miridae (Hemiptera). (With keys to subfamilies and tribes and a catalogue of the world genera). Anais da Academia Brasileira de Ciencias 24: 31–110.

Carvalho, J.C.M. 1955. Keys to the genera of Miridae of the world (Hemiptera). Boletim do Museu Paraense Emilio Goeldi, Zoologia 11: 1–151, l6 pls.

Carvalho, J.C.M. 1958. A catalogue of the Miridae of the world. Part II. Arquivos do Museu Nacional, Rio de Janeiro 45: 216 pp.

Cassis, G. 2008. The *Lattinova* complex of the austromirine plant bugs (Hemiptera: Heteroptera: Miridae: Orthotylinae). Proceedings of the Entomological Society of Washington 110: 845–939.

Cassis, G., and R.T. Schuh. 2012. Systematics, biodiversity, biogeography, and host associations of the Miridae (Insecta: Hemiptera: Heteroptera: Cimicomorpha). Annual Review of Entomology 57: 377–404.

Cassis, G., and C. Symonds. 2008. Systematics, biogeography and host associations of the lace bug genus *Inoma* (Hemiptera: Heteroptera: Tingidae). Acta Entomologica Musei Nationalis Pragae 48 (2): 433–484.

Cassis, G., and C. Symonds. 2011. Systematics, biogeography and host plant associations of the lace bug genus *Lasiacantha* Stål in Australia (Insecta: Hemiptera: Heteroptera: Tingidae). Zootaxa 2818: 1–63.

China, W.E., and J.G. Myers. 1929. A reconsideration of the classification of the cimicoid families (Heteroptera), with the description of two new spider web bugs. Annals and Magazine of Natural History (10) 3: 97–125, figs. 1–5.

Chinnock, R.J. 2007. *Eremophila* and allied genera: a monograph of Myoporaceae. Botanical Gardens and State Herbaria of South Australia. Dural, N.S. W., Australia: Rosenberg Publishing.

Cobben, R.H. 1968. Evolutionary trends in Heteroptera. Part I. Eggs, architecture of the shell, gross embryology and eclosion. Wageningen, Netherlands: Centre for Agricultural Publishing and Documentation, 475 pp.

Goel, S.C., and C.W. Schaefer. 1970. The structure of the pulvillus and its taxonomic value in the land Heteroptera (Hemiptera). Annals of the Entomological Society of America 63: 307–313.

Kerzhner, I.M., 1988. Infraorder Cimicomorpha. 21. Family Miridae (Capsidae). In P.A. Ler (editor), Opredelitel'nasekomykh Dal'nego Vostoka SSSR [Keys to the identification of insects of the Soviet Far East]. Vol. 2, Homoptera and Heteroptera: 778–857. Leningrad: Nauka, 972 pp.

Knight, H.H. 1918. Synoptic key to the subfamilies of Miridae (Hemiptera-Heteroptera). Journal of the New York Entomological Society 26: 40–44.

Knight, H.H. 1923. Guide to the insects of Connecticut. Part IV. The Hemiptera or sucking insects of Connecticut – Family Miridae (Capsidae). State of Connecticut Geological and Natural History Survey, Bulletin 34: 422–658.

Knight, H.H. 1929. *Labops verae*, new species, with *Labopella*, *Nicholia*, and *Pronotocrepis*, new genera of North American Miridae (Hemiptera). Canadian Entomologist 61: 214–218.

Knight, H.H. 1941. The plant bugs, or Miridae, of Illinois. Bulletin of the Illinois Natural History Survey 22: 1–234.

Knight, H.H. 1968. Taxonomic review: Miridae of the Nevada test site and the western United States. Brigham Young University Science Bulletin, Biological Series 9: 1–282.

Linnavuori, R.E. 1975. Hemiptera of the Sudan, with remarks on some species of the adjacent countries. 4. Miridae and Isometopidae. Annales Zoologici Fennici 12: 1–118.

Menard, K.L., and R.T. Schuh. 2011. Revision of Leucophoropterini: diagnoses, key to genera, redescription of the Australian fauna, and descriptions of new Indo-Pacific genera and species (Insecta: Hemiptera: Miridae). Bulletin of the American Museum of Natural History 361: 1–159.

Menard, K.L., R.T. Schuh, and J.B. Woolley. 2014. Total-evidence phylogenetic analysis and reclassification of the Phylinae (Insecta: Heteroptera: Miridae), with the recognition of new tribes and subtribes and a redefinition of Phylini. Cladistics 30: 391–427.

Menard, K.L., and J.B. Woolley. 2014. A phylogenetic study of the generic relationships within the subtribe Leucophoropterina Schuh (Miridae: Phylinae: Leucophoropterini). Systematic Entomology, 39: 412–430.

Oxelman, B., P. Kornhall, Olmstead, R.G. and B. Bremer. 2005. Further disintegration of Scrophulariaceae. Taxon 54: 411–425.

Poppius, B. 1914. Die Miriden der Äthiopischen Region II – Macrolophinae, Heterotominae, Phylinae. Acta Societatis Scientiarum Fennicae 44 (3): 1–136.

Reuter, O.M. 1883. Hemiptera gymnocerata Europae. Hémiptères gymnocérates d'Europe, du bassin de la Méditerrranée et de l'Asie Russe 3: 313–496, 5 pls., suppl. 497–568.

Reuter, O.M. 1910. Neue Beiträge zur Phylogenie und Systematik der Miriden nebst einleitenden Bemerkungen über die Phylogenie der Heteropteren-Familien. Mit einer Stammbaumstafel. Acta Societatis Scientiarum Fennicae 37 (3): iv + 167 pp.

Rix, M.G., et al. 2014. Biogeography and speciation of terrestrial fauna in the south-western Australian biodiversity hotspot. Biological Reviews 90: 762–793.

Schuh, R.T. 1974. The Orthotylinae and Phylinae (Hemiptera: Miridae) of South Africa with a phylogenetic analysis of the ant-mimetic tribes of the two

subfamilies for the world. Entomologica Americana 47: 1–332.

Schuh, R.T. 1976. Pretarsal structure in the Miridae (Hemiptera) with a cladistic analysis of relationships within the family. American Museum Novitates 2601: 1–39.

Schuh, R.T. 1984. Revision of the Phylinae (Hemiptera, Miridae) of the Indo-Pacific. Bulletin of the American Museum of Natural History 177 (1): 1–476.

Schuh, R.T. 1991. Phylogenetic, host and biogeographic analysis of the Pilophorini (Heteroptera: Miridae: Phylinae). Cladistics 7: 157–189.

Schuh, R.T. 1995. Plant bugs of the world (Insecta: Heteroptera: Miridae). Systematic catalog, distributions, host list, and bibliography. New York: New York Entomological Society, 1329 pp.

Schuh, R.T. 2000. Revision of the North American plant bug genus *Megalopsallus* Knight, with the description of eight new species from the West (Heteroptera: Miridae: Phylinae). American Museum Novitates 3305: 1–69.

Schuh, R.T. 2002–2015. Plant bugs of the World (Heteroptera: Miridae): systematic catalog, distributions, host list, and bibliography. Online resource (http://research.amnh.org/pbi/catalog/).

Schuh, R.T. 2006. Revision, phylogenetic, biogeographic, and host analysis of the endemic western North American *Phymatopsallus* group, with the description of 9 new genera and 15 new species (Insecta: Hemiptera: Miridae: Phylinae). Bulletin of the American Museum of Natural History 301: 1–115.

Schuh, R.T., and P. Pedraza. 2010. *Wallabicoris*, new genus (Hemiptera: Miridae: Phylinae: Phylini) from Australia, with the description of 37 new species and an analysis of host associations. Bulletin of the American Museum of Natural History 338: 1–118.

Schuh, R.T., and C. Weirauch. 2010. Myrtaceae-feeding Phylinae (Hemiptera: Miridae) from Australia: description and analysis of phylogenetic and host relationships for a monophyletic assemblage of three new genera. Bulletin of the American Museum of Natural History 344: 1–95.

Schuh, R.T., and K.L. Menard. 2011. Santalalean-feeding plant bugs: 10 new species in the genus *Hypseloecus* Reuter from Australia and South Africa (Heteroptera: Miridae: Phylinae): their hosts and placement in the Pilophorini. Australian Journal of Entomology 50: 365–392.

Schuh, R.T., and K.L. Menard. 2013. A revised classification of the Phylinae (Insecta: Heteroptera: Miridae): arguments for the placement of genera. American Museum Novitates 3785: 1–72.

Schuh, R.T., and M.D. Schwartz. 2004. New genera, new species, new synonyms, and new combinations in North America and Caribbean Phylinae (Heteroptera: Miridae). American Museum Novitates 3436: 1–36.

Schwartz, M.D. 2005. Redescription of *Strophopoda aprica* Van Duzee and the description of two new genera and five new species from the southwestern United States and northern Mexico (Heteroptera: Miridae). American Museum Novitates 3489: 1–23.

Schwartz, M.D., and G.G.E. Scudder. 2003. Seven new species of Miridae (Heteroptera) from British Columbia and Alaska and synonymy of *Adelphocoris superbus* (Uhler). Journal of the New York Entomological Society 111: 65–95.

Symonds, C., and G. Cassis. 2013. New species of the lace bug genus *Lasiacantha* Stål (Insecta: Hemiptera: Heteroptera: Tingidae) from Western Australia. Australian Journal of Entomology 52: 53–66.

Wagner, E. 1952. 41-Teil-Blindwanzen oder Miriden, *In* Die Tierwelt Deutschlands und der angrenzenden Meersteile nach ihren Merkmalen und nach ihrer Lebensweise. Jena: G. Fischer, 218 pp.

Wagner, E. 1969. Ueber *Macrotylus* Fieber, 1858 (Hemiptera, Heteroptera). Memorie della Società entomologica italiana. 48: 300–310.

Wagner, E. 1974. Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 2. Entomologische Abhandlungen 39 Suppl. ii + 421 pp.

Weirauch, C. 2007. Revision and cladistic analysis of the *Polyozus* group of Australian Phylini (Heteroptera: Miridae: Phylinae). American Museum Novitates 3590: 1–60.

Weirauch, C. and R.T. Schuh. 2011 ("2010"). Southern hemisphere distributional patterns in plants bugs (Hemiptera: Miridae: Phylinae): *Xiphoidellus*, gen. nov. from Australia and *Ampimpacoris*, gen. nov. from Argentina, show transantarctic relationships. Invertebrate Systematics 24: 473–508.

Wyniger, D. 2010. Resurrection of the Pronotocrepini Knight, with revisions of the Nearctic genera *Orectoderus* Uhler, *Pronotocrepis* Knight, and *Teleorhinus* Uhler, and comments on the Palearctic *Ethelastia* Reuter (Heteroptera: Miridae: Phylinae). American Museum Novitates 3703: 1–67.

Wyniger, D. 2012 ("2011"). Revision of the Nearctic genus *Coquillettia* Uhler with a transfer to the tribe Phylini, the description of 14 new species, a new synonymy, and the description of two new Nearctic genera *Leutiola* and *Ticua* and two new species (Heteroptera: Miridae: Phylinae). Entomologica Americana 117: 134–211.

Yasunaga, T., K. Yamada, and T. Artchawakom. 2015. First Indochinese records of the plant bug genus *Hypseloecus* Reuter (Hemiptera: Heteroptera: Miridae: Phylinae: Pilophorini), with descriptions of eight new species from Thailand. Zootaxa 3925 (1): 75–93.

PLATES

Plate 1. Digital habitus and endosomal image of *Adunatiphylus kalbarri*.

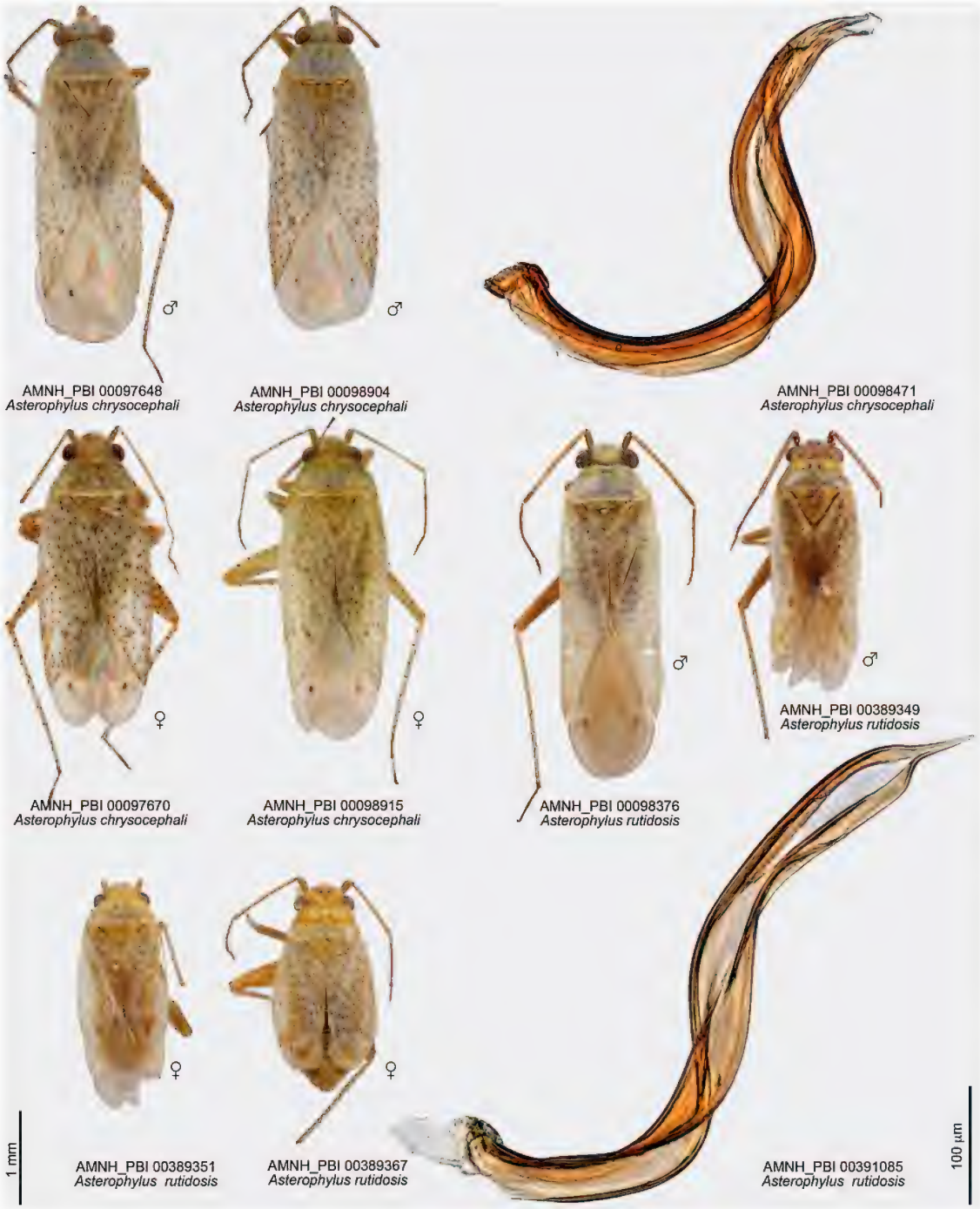


Plate 2. Digital habitus and endosomal images of *Asterophylus* spp.

Plate 3. Digital habitus and endosomal images of *Austroplagiognathus* spp.

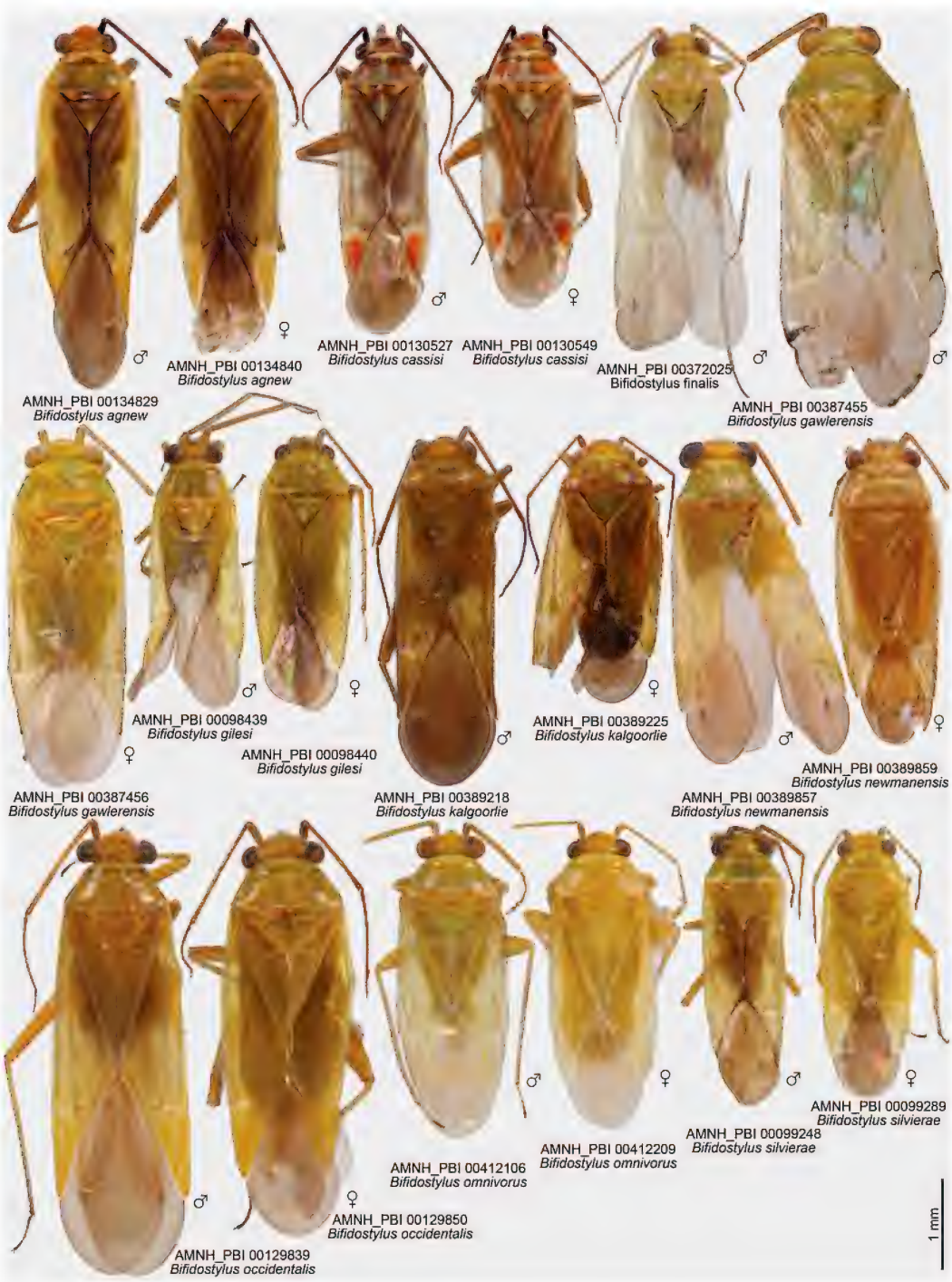


Plate 4. Digital habitus images of *Bifidostylus* spp.

Plate 5. Digital endosomal images of *Bifidostylus* spp.

Plate 6. Digital habitus images of *Dicyphylus* spp.

Plate 7. Digital endosomal images of *Dicyphylus* spp.

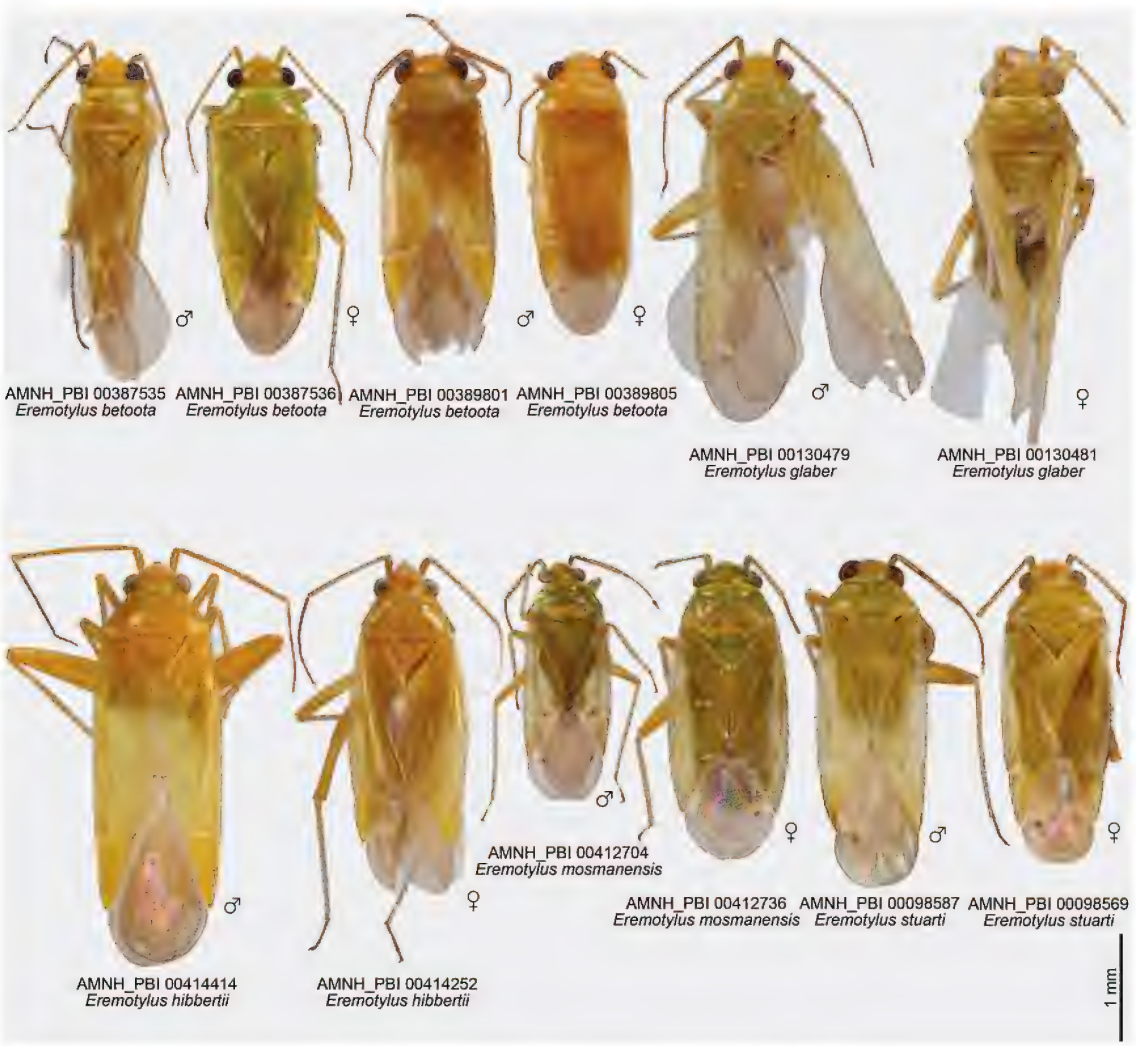


Plate 8. Digital habitus images of *Eremotylus* spp.

Plate 9. Digital endosomal images of *Eremotylus* spp.

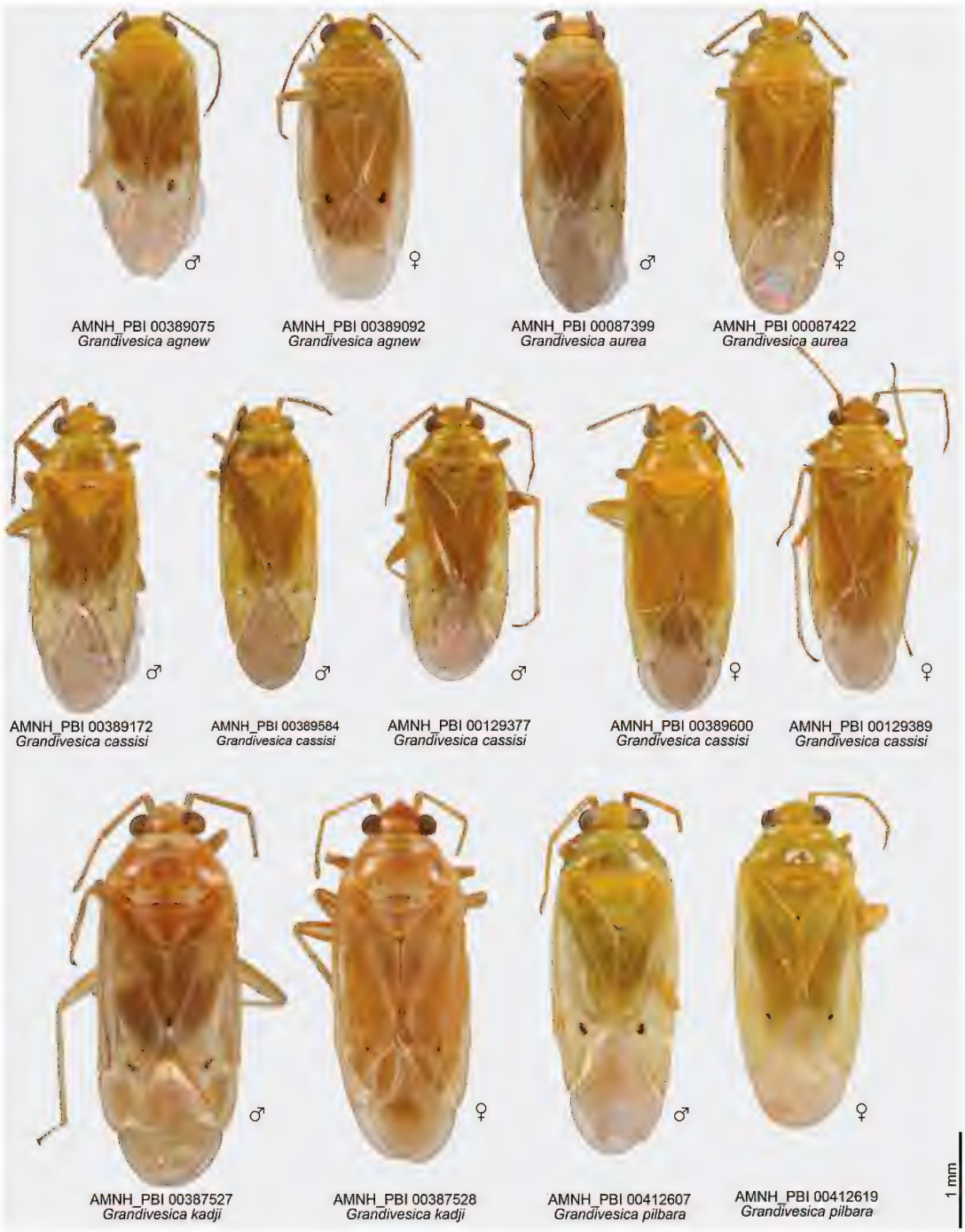


Plate 10. Digital habitus images of *Grandivesica* spp.

Plate 11. Digital endosomal images of *Grandivesica* spp.

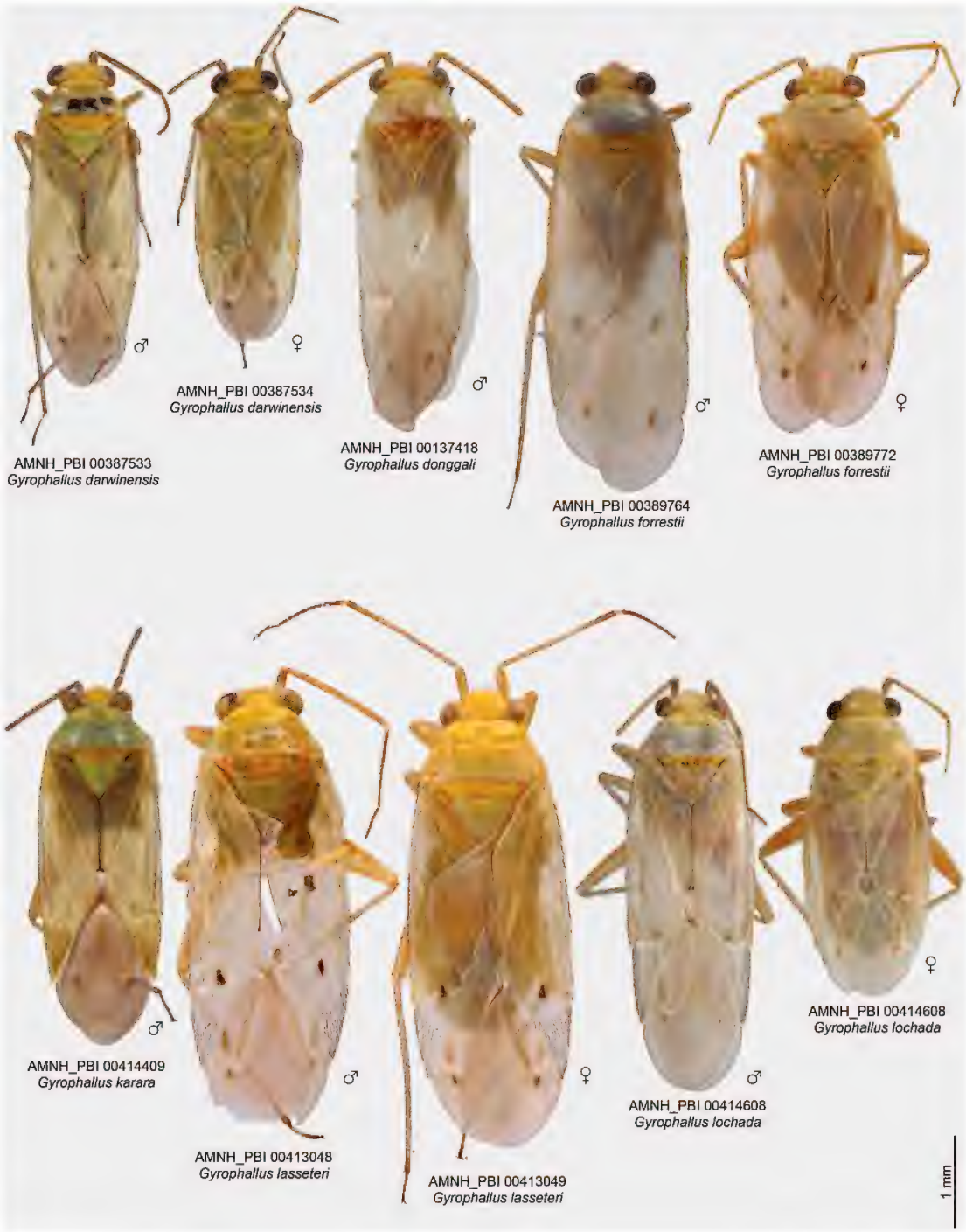


Plate 12. Digital habitus images of *Gyrophallus darwinensis–G. lochada*.

Plate 13. Digital endosomal images of *Gyrophallus darwinensis–G. lochada.*

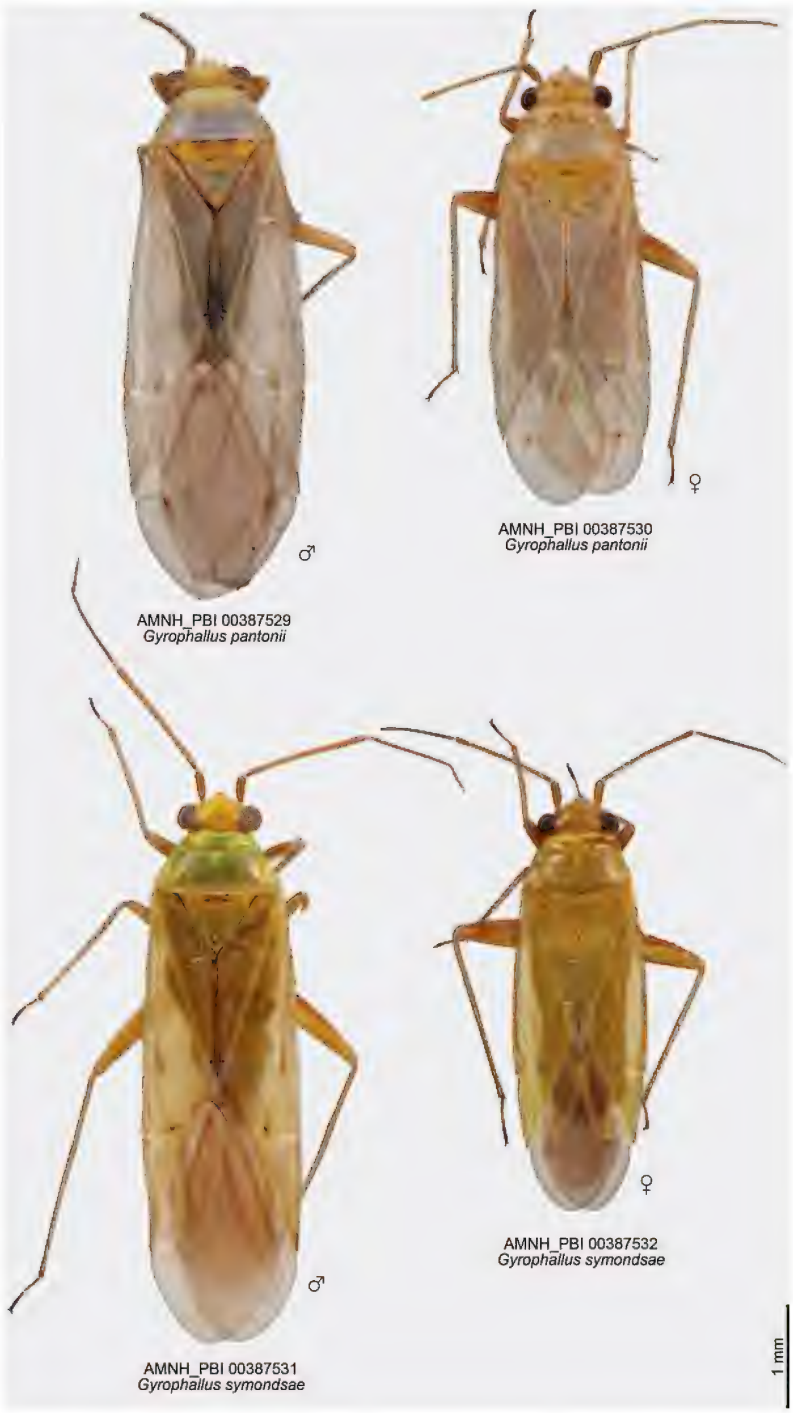


Plate 14. Digital habitus images of *Gyrophallus pantonii–G. symondsae.*

Plate 15. Digital endosomal images of *Gyrophallus pantonii–G. symondsae*.

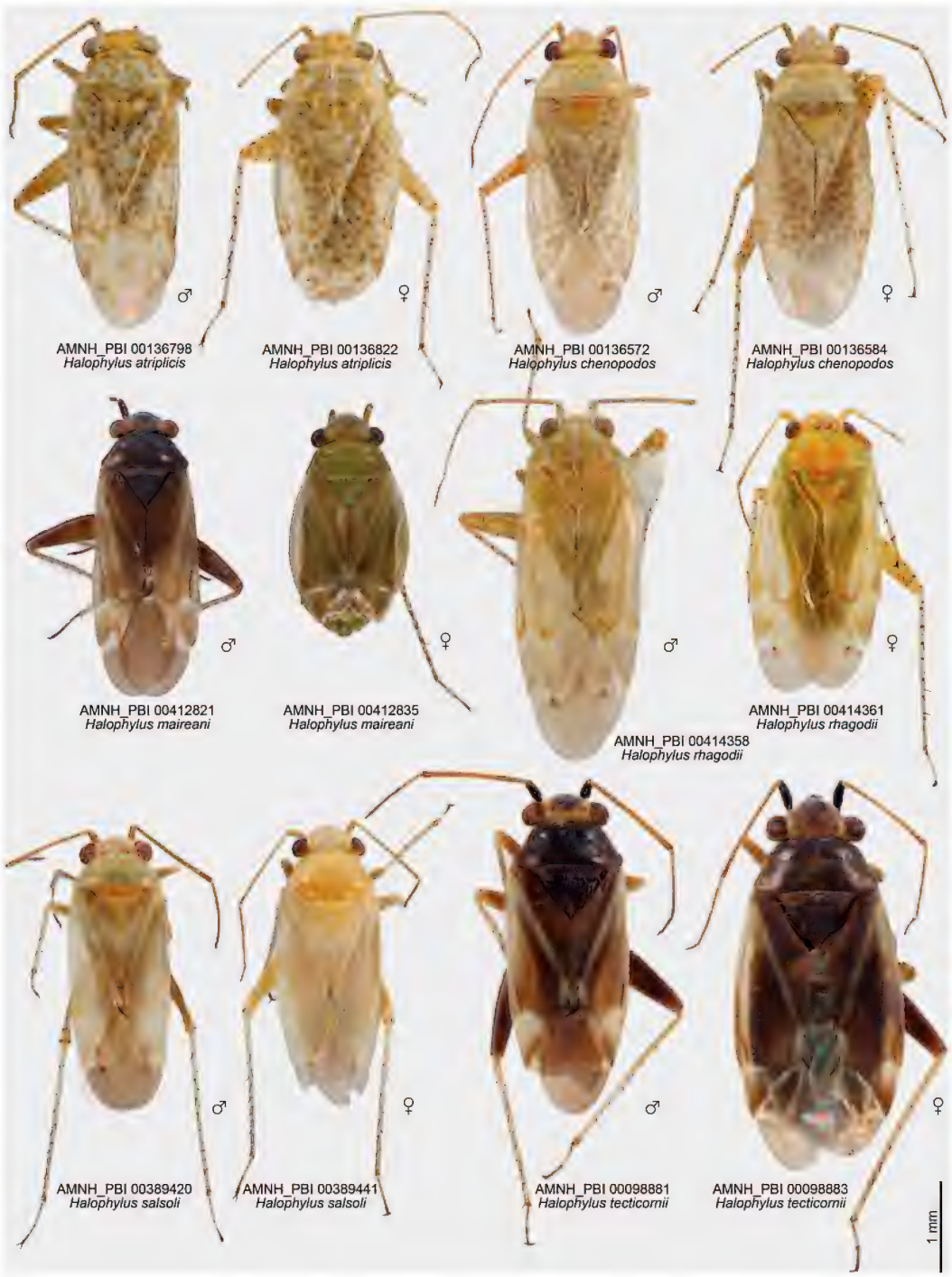


Plate 16. Digital habitus images of *Halophylus* spp.

Plate 17. Digital endosomal images of *Halophylus* spp.

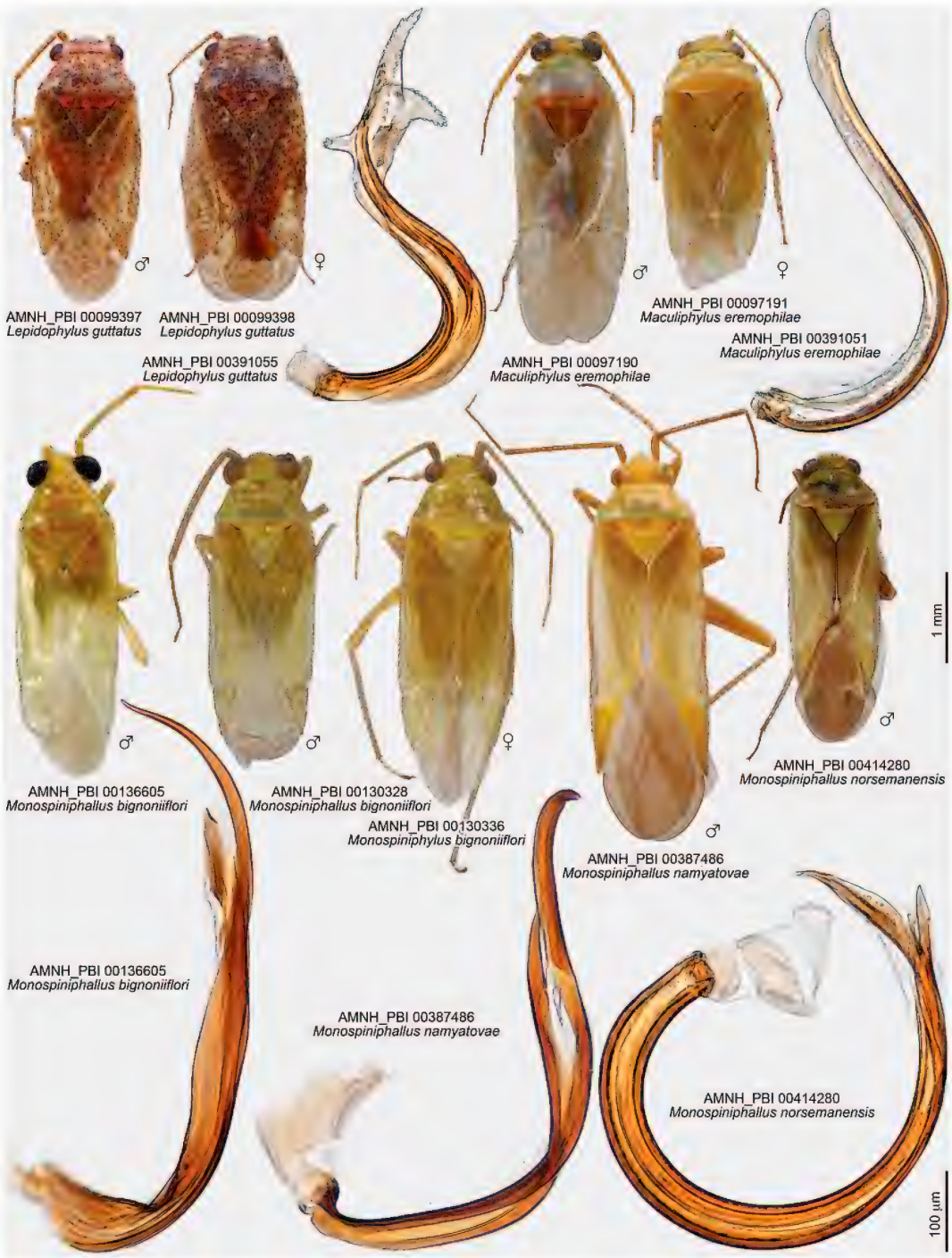


Plate 18. Digital habitus and endosomal images of *Lepidophylus guttatus, Maculiphylus eremophilae,* and *Monospiniphallus* spp.

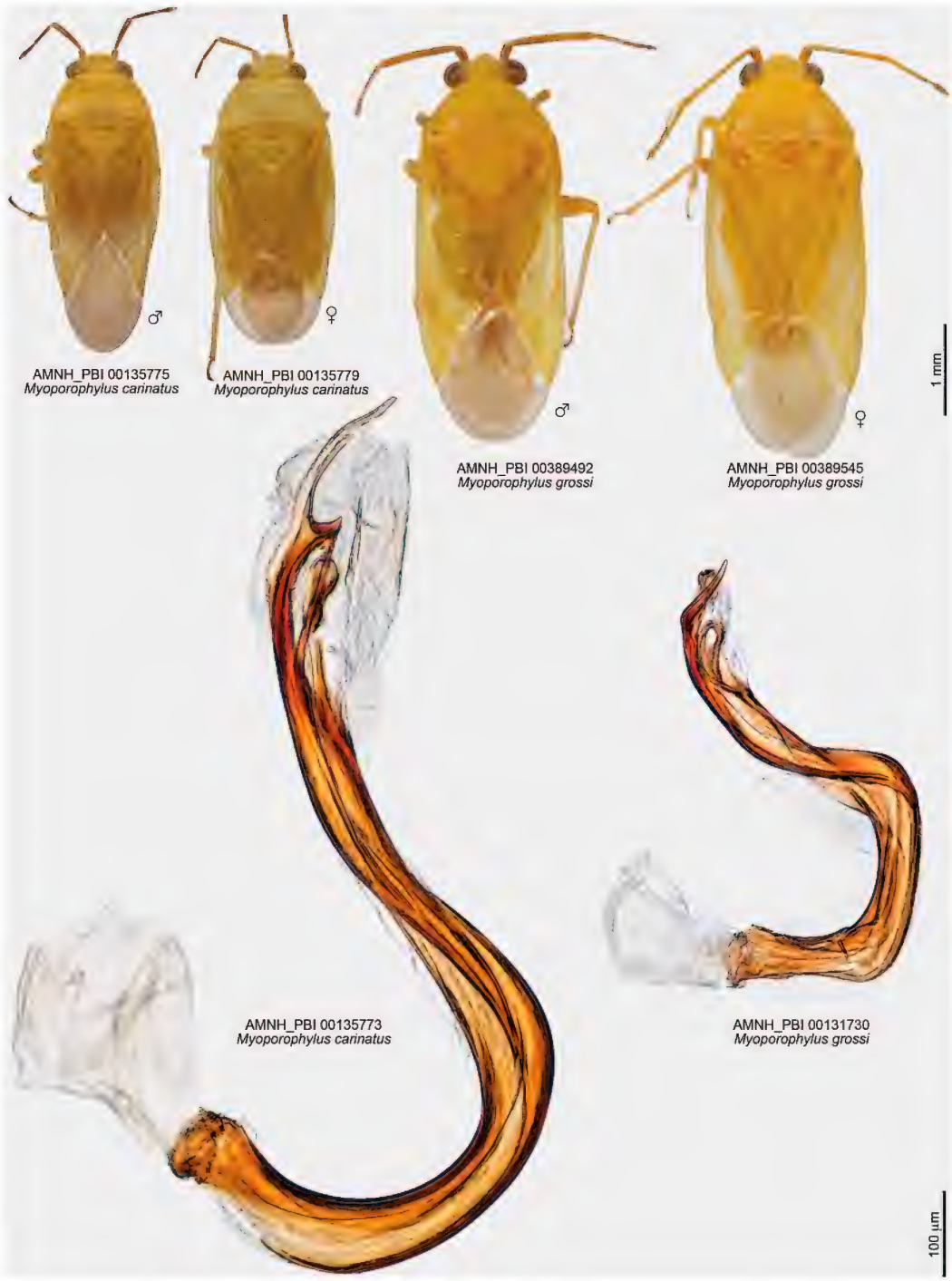


Plate 19. Digital habitus and endosomal images of *Myoporophylus* spp.

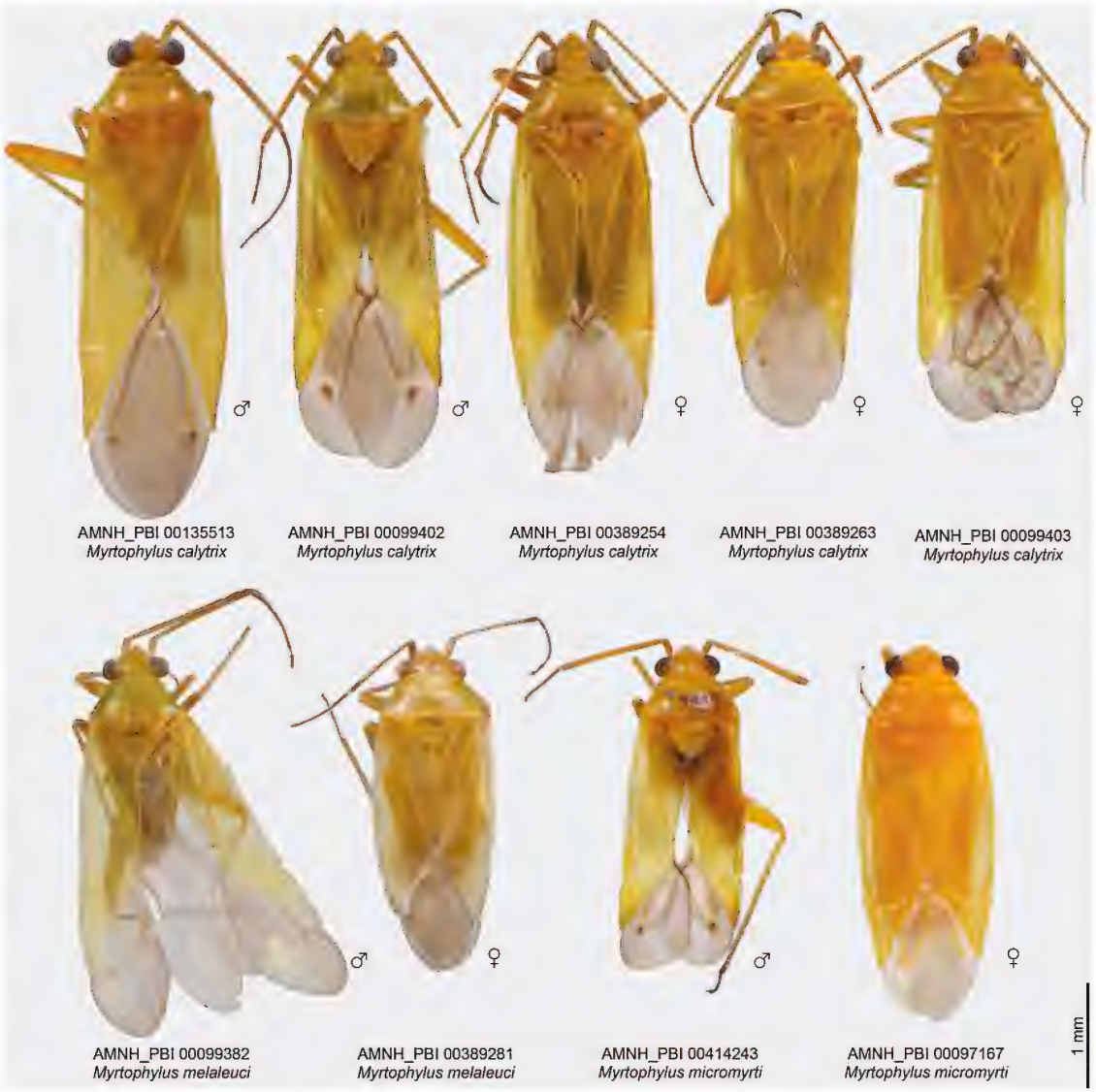


Plate 20. Digital habitus images of *Myrtophylus* spp.

Plate 21. Digital endosomal images of *Myrtophylus* spp.

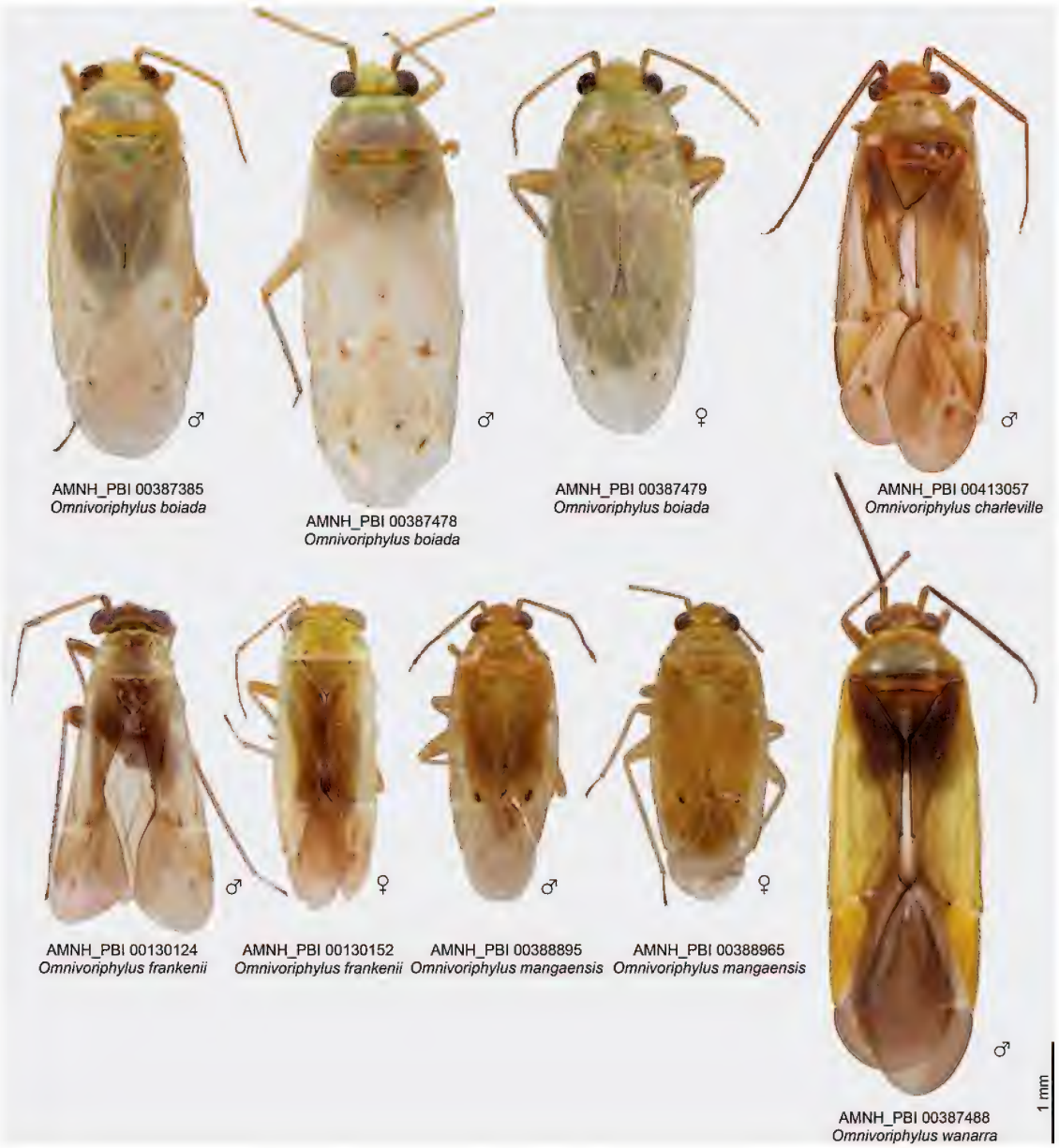


Plate 22. Digital habitus images of *Omnivoriphylus* spp.

Plate 23. Digital endosomal images of *Omnivoriphylus* spp.

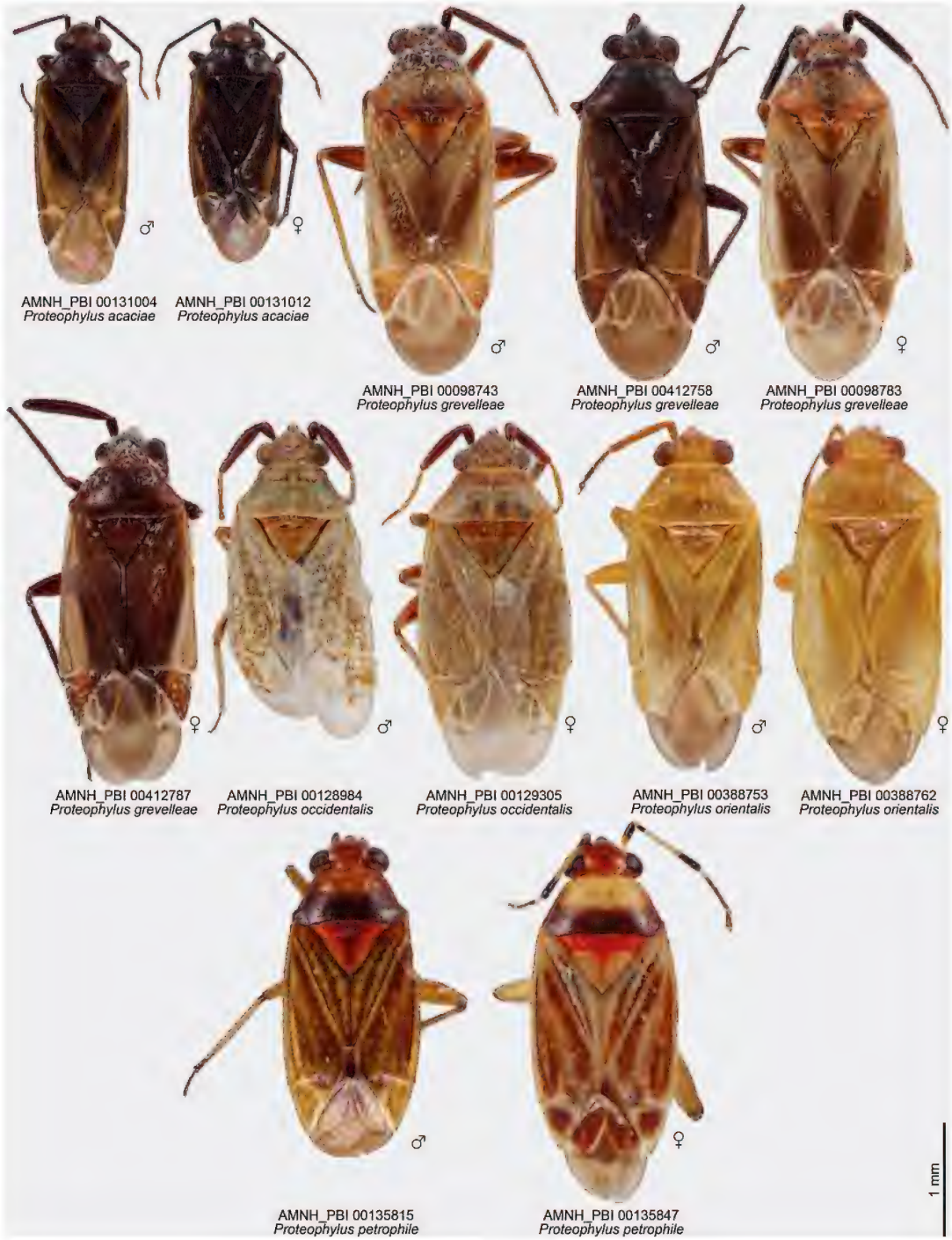


Plate 24. Digital habitus images of *Proteophylus* spp.

Plate 25. Digital endosomal images of *Proteophylus* spp.

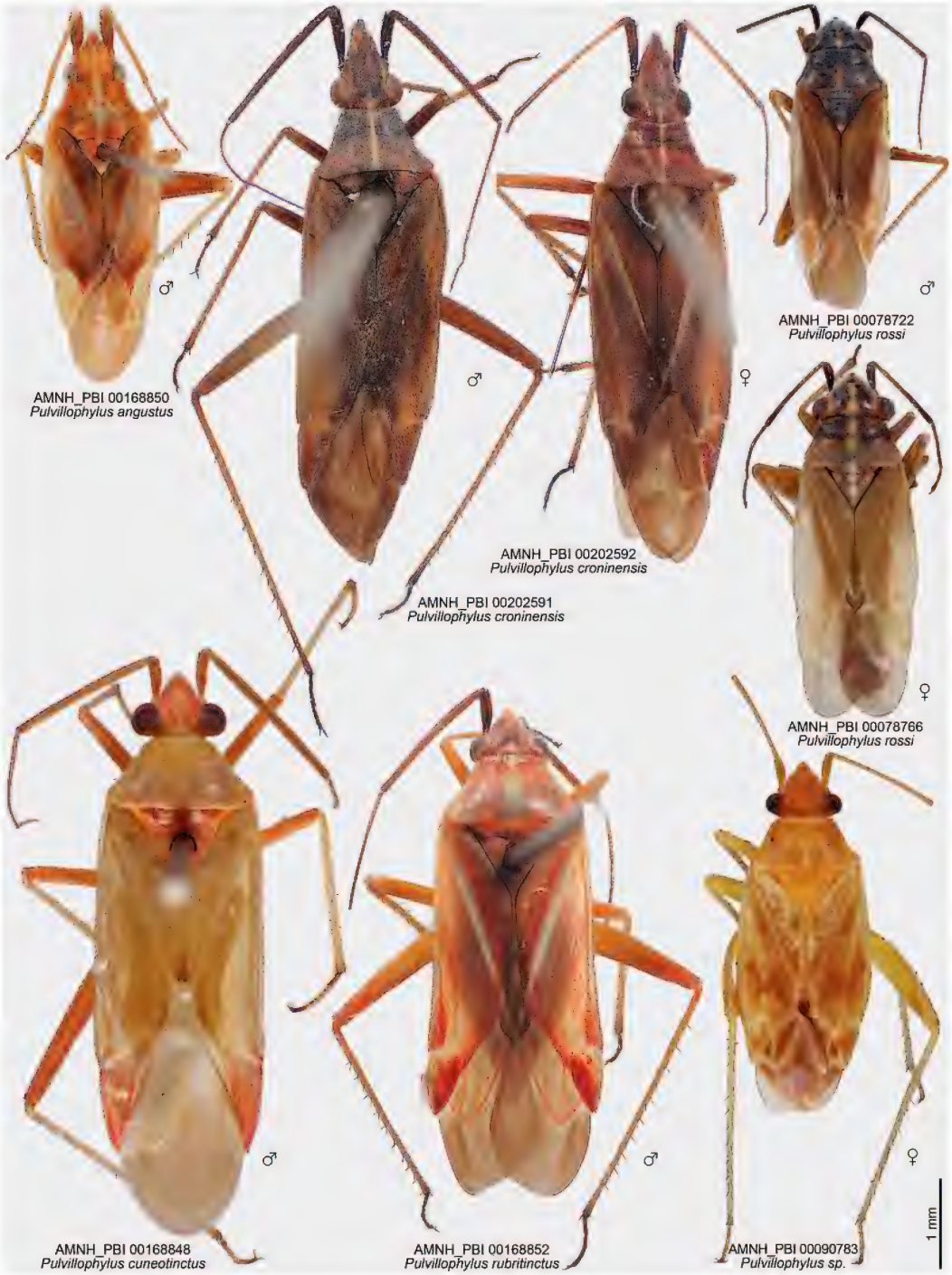


Plate 26. Digital habitus images of *Pulvillophylus* spp.

Plate 27. Digital endosomal images of *Pulvillophylus* spp.

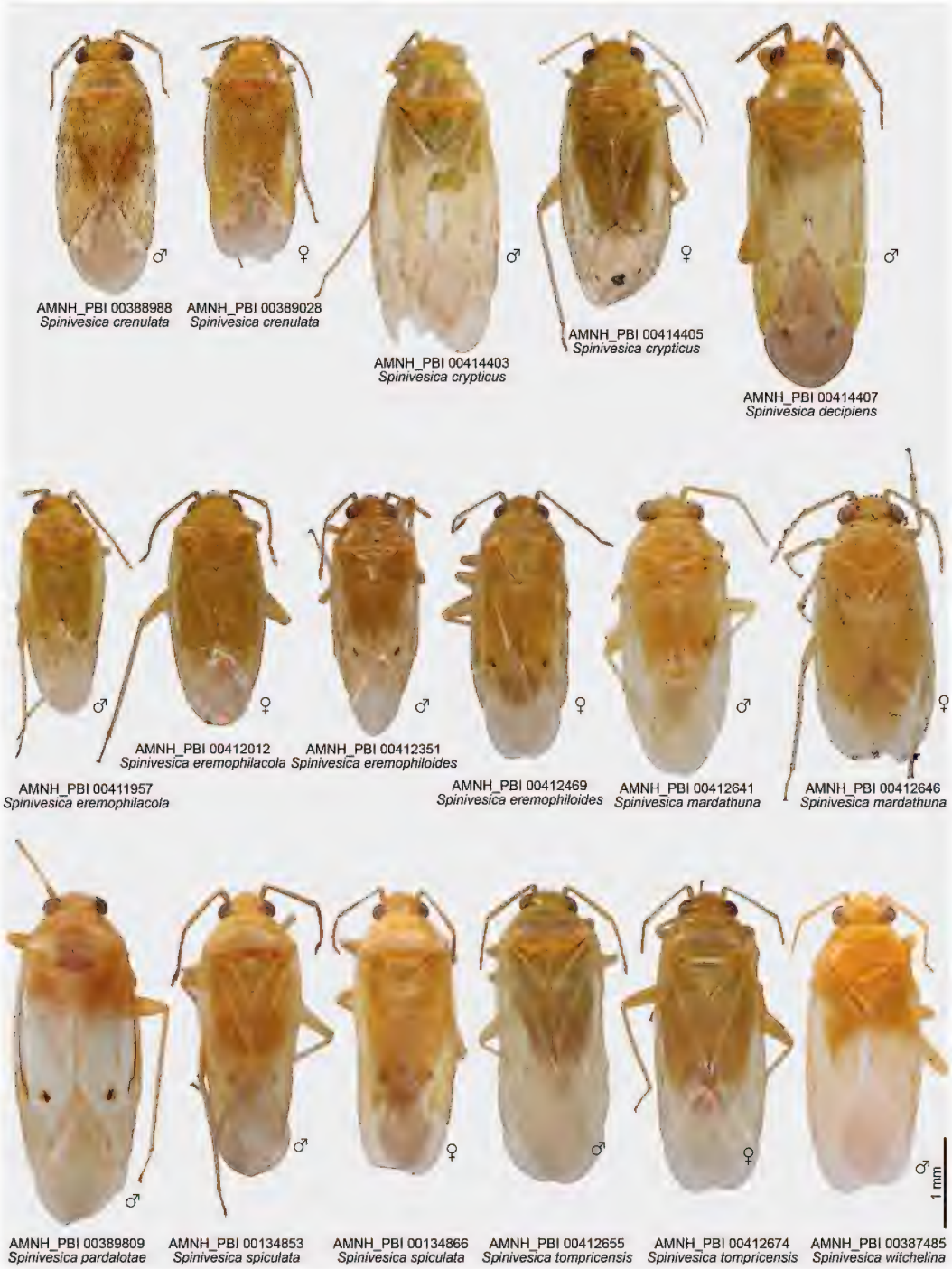


Plate 28. Digital habitus images of *Spinivesica* spp.

Plate 29. Digital endosomal images of *Spinivesica* spp.

Plate 30. Digital habitus and endosomal images of *Telophylus* spp.

Plate 31. Hosts of Australian Cremnorrhinina: ASTERACEAE. **A.** *Brachyscome ciliaris* var. *lanuginosa*: NT: 25.3 km NW of Bond Springs on Tanami Rd. **B.** *Chrysocephalum puteale*: WA: 49.1 km N of Norseman. **C.** *Leucochrysum stipitatum*: NT: 26.8 km W of Tanami Rd on Mt Wedge Station Rd. **D.** *Rutidosis helichrysoides*: NT: 25.3 km NW of Bond Springs on Tanami Rd. BORAGINACEAE. **E.** *Halgania cyanea*: WA: ca 35 km S of Menzies.

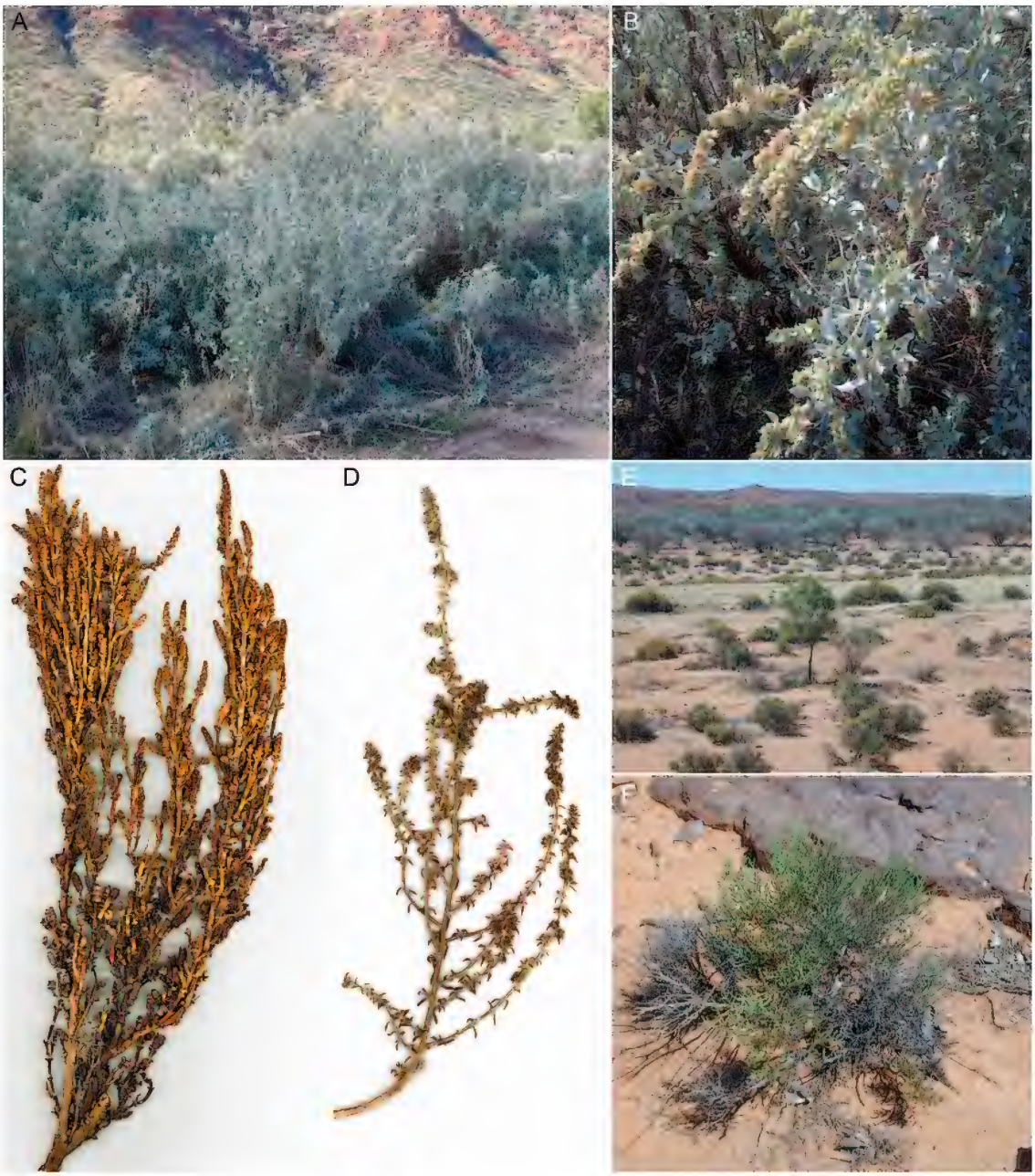


Plate 32. Hosts of Australian Cremnorrhinina: CHENOPODIACEAE. **A.** *Atriplex nummularia*: NT: Trephina Gorge National Park. **B.** *Atriplex nummularia*: NT: Same. **C.** *Haloscaria indica bidens*: WA: 22 km S of Watheroo. **D.** *Salsola kali*: SA: 20 km NW of Innamincka, Innamincka Reg. Res. **E.** *Tecticornia disarticulata*: SA: 63 km NW of Maree. **F.** *Tecticornia disarticulata*: Same.

Plate 33. Hosts of Australian Cremnorrhinina: DILLENIACEAE. **A.** *Hibbertia cuneiformis*: WA: Cape Naturaliste National Park. FABACEAE. **B.** *Acacia rossei*: WA: 13 km E of Southern Cross. **C.** GOODENIACEAE. *Goodenia ramelii*: WA: 28 km S of Menzies. LAMIACEAE. **D.** *Prostanthera campbellii*: WA: ca 35 km S of Menzies.

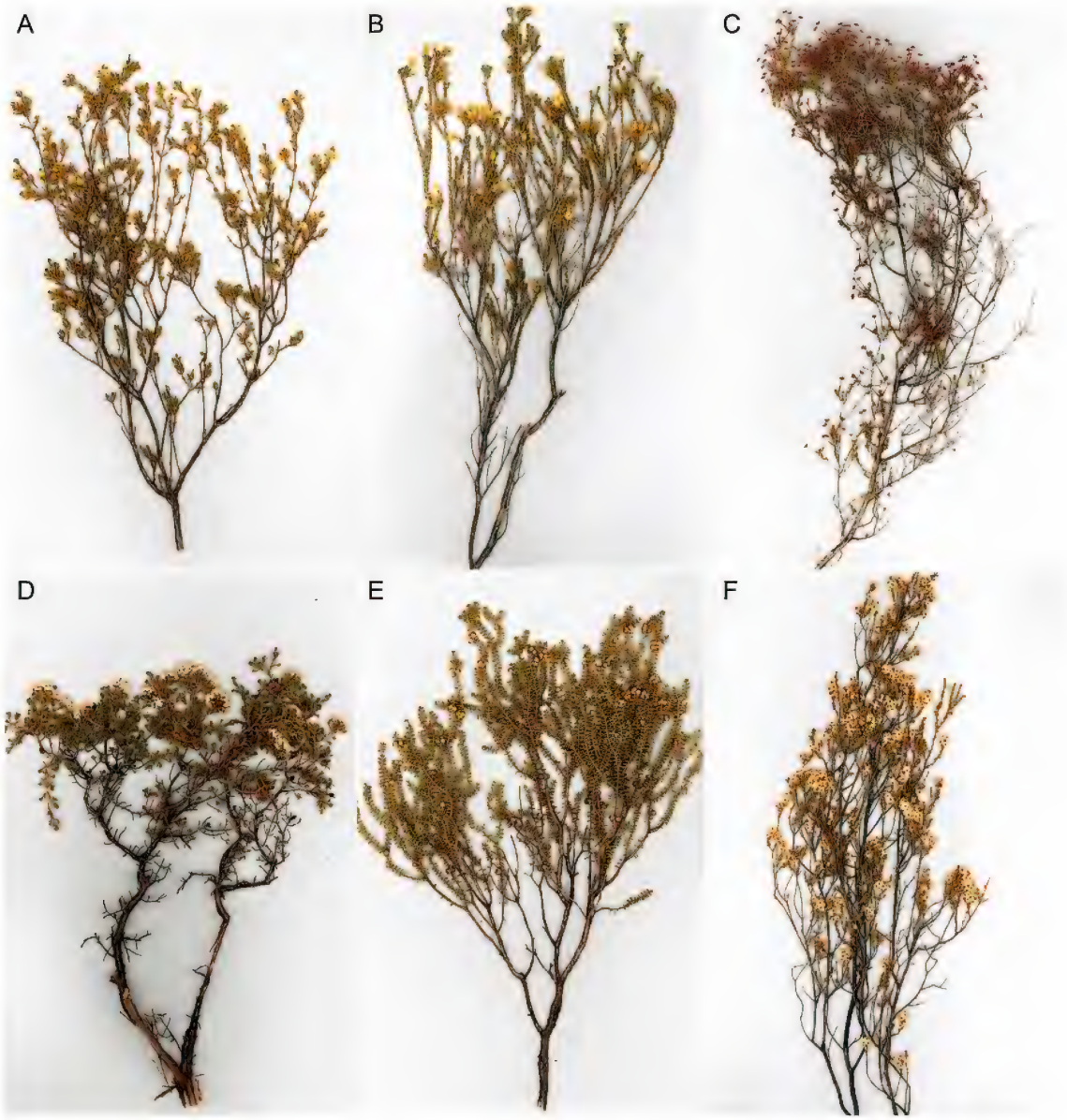


Plate 34. Hosts of Australian Cremnorrhinina: MYRTACEAE. **A.** *Aluta aspera*: WA: 28 km S of Menzies (3.5 km E of Hiway). **B.** *Calytrix angulata*: Same. **C.** *Calytrix brevifolia*: WA: Frank Hann National Park, Lillian Stoke Rock. **D.** *Darwinia diosmoides*: WA: Kalbarri National Park, Loop Road. **E.** *Melaleuca sheathiana*: WA: 21 km E of Kalgoorlie near transcon. railroad. **F.** *Thryptomene urceolaris*: WA: 28 km S of Menzies (3.5 km E of Hiway).

Plate 35. Hosts of Australian Cremnorrhinina: PROTEACEAE. **A.** *Grevillea eriostachia*: NT: 35.4 km W of Uluru at Kata Tjuta jct on Lasseter Hiway. **B.** *Grevillea eriostachya*: Same. **C.** *Grevillea eriostachya*: WA: Kalbarri National Park, Meanarra Hill. **D.** *Grevillea hookeriana apiciloba*: WA: 2 km E of Nungarin on Rt 50. **E.** *Grevillea juncifolia*: WA: 28 km S of Menzies (3.5 km E of Hiway). **F.** *Grevillea pterosperma*: WA: 2 km E of Nungarin on Rt 50. **G.** *Grevillea wittmeri*: WA: Pallarup Nature Reserve, west side.

Plate 36. Hosts of Australian Cremnorrhinina: PROTEACEAE. **A.** *Petrophile drummondii*: WA: 11 km S of Eneabba, Eneabba National Park. **B.** *Petrophile drummondii*: WA: 11 km S of Eneabba on Brand Hiway, Eneabba Reserve. **C.** *Petrophile durmmondii*: Same.

Plate 37. Hosts of Australian Cremnorrhinina: SCROPHULARIACEAE. **A.** *Eremophila caperata*: WA: 60 km W of Coolgardie on Great Eastern Hiway. **B.** *Eremophila caperata*: Same. **C.** *Eremophila caperata*: Same. **D.** *Eremophila clarkei*: WA: 24 km SE of jct of Manga Rd and Shark Bay Rd, Shark Bay World Heritage Area. **E.** *Eremophila clarkei*: Same. **F.** *Eremophila dempsteri*: WA: 35 km W of Balladonia on Eyre Hiway. **G.** *Eremophila forrestii* F. Muell.: WA: 31.7 km W of Agnew toward Sandstone. **H.** *Eremophila freelingii* F. Muell.: NT: 33 km E of Alice Springs on Ross Hiway. **I.** *Eremophila freelingii*: Same.

Plate 38. Hosts of Australian Cremnorrhinina: SCROPHULARIACEAE. **A.** *Eremophila duttonii*: NT: 67 km E of Stuart Hiway on Arltunga Stn Rd. **B.** *Eremophila duttonii*: Same. **C.** *Eremophila ionantha* Diels: WA: 115.4 km E of Norseman. **D.** *Eremophila ionantha* Diels: WA: 4.3 km N of Peak Charles National Park. **E.** *Eremophila ionantha*: Same. **F.** *Eremophila longifolia*: NT: 21 km W of Stuart Hiway on Ernest Giles Rd. **G.** *Eremophila longifolia*: Same. **H.** *Eremophila platythamnos*: WA: ca 35 km S of Menzies.

Plate 39. Hosts of Australian Cremnorrhinina: SCROPHULARIACEAE. **A.** *Eremophila setacea*: WA: 66.2 km E of North West Coastal Hiway on Mardathuna Rd. **B.** *Eremophila spuria*: WA: 80.2 km W of Agnew toward Sandstone. **C.** *Eremophila sturtii*: NT: 67 km E of Stuart Hiway on Arltunga Stn Rd. **D.** *Eremophila sturtii*: Same. **E.** *Eremophila sturtii*: NSW: 34 km SW Bourke toward Louth. **F.** *Myoporum platycarpum*: SA: 96 km NW of Morgan, Pine Valley Stn. SOLANACEAE. **G.** *Solanum lasiophyllum*: WA: ca 35 km S of Menzies.

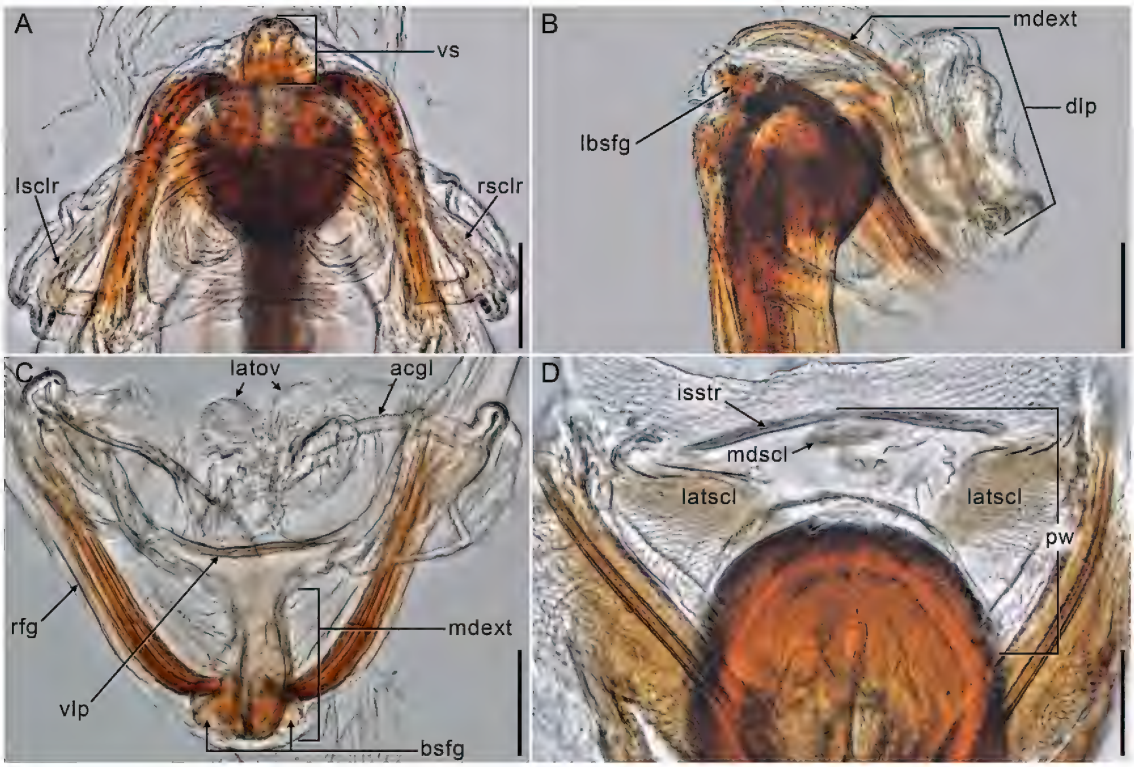


Plate 40. Digital female genitialic images of *Adunatiphylus kalbarri.* **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, left lateral view. **C.** Bursa copulatix, caudal view. **D.** Posterior wall, anterior view. AMNH_PBI 00389653: A, B; AMNH_PBI 00389641: C, D. Scales A–C, 100 m, D, 50 m. ABBREVIATIONS FOR THIS AND SUBSEQUENT PLATES: **acgl,** accessory (vermiform) gland; **bsfg,** basal sclerite of first gonapophyses; **dlp,** dorsal labiate plate; **irscl,** interramal sclerites (lateral and medial); **isstr,** intersegmental structure; **latov,** lateral oviduct; **latscl,** lateral interramal sclerite; **lbsfg,** left basal sclerite of first gonapophysis; **lsclr,** left sclerotized ring; **mdext,** medioventral extension of ventral labiate plate; **mdscl,** medial interramal sclerite; **pw,** posterior wall; **rfg,** right first gonapophyses; **rsclr,** right sclerotized ring; **smrcpt,** seminal receptacle; **vlp,** ventral labiate plate; **vs,** vestibular sclerites.

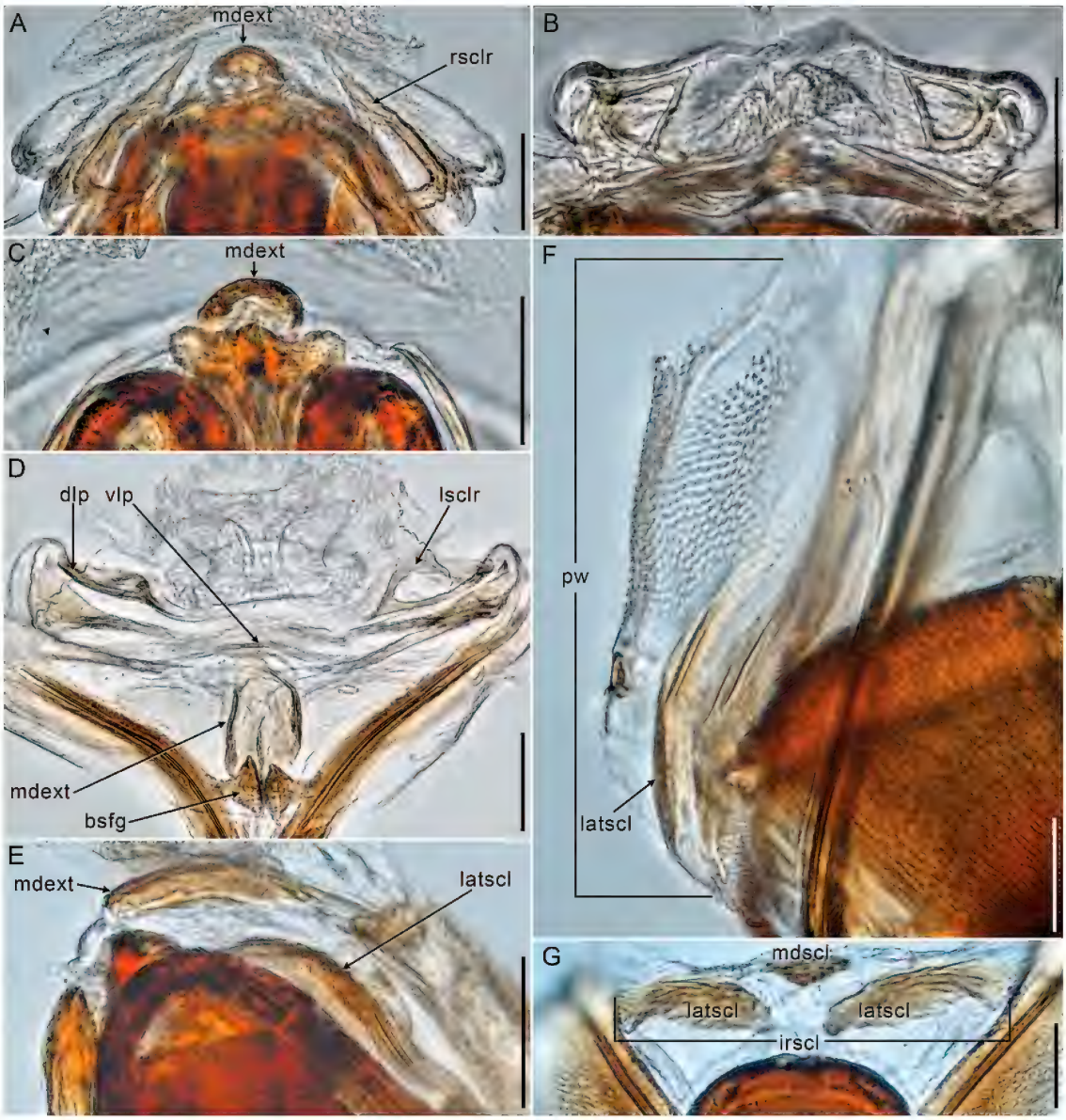


Plate 41. Digital female genitialic images of *Asterophylus* spp. **A, B.** Bursa copulatrix, dorsal view. **C.** Bursa copulatrix, ventral view. **D.** Bursa copulatix, caudal view. **E.** Bursa copulatrix left lateral view. **F.** Posterior wall, left lateral view. **G.** Posterior wall, anterior view. *A. chrysocephali* AMNH_PBI 00098502: B; AMNH_PBI 00098502: G. *A. rutidosis* AMNH_PBI 00135674: A, C, E; AMNH_PBI 00098401: D, F. Scales A–E, 100 m, F, G, 50 m.

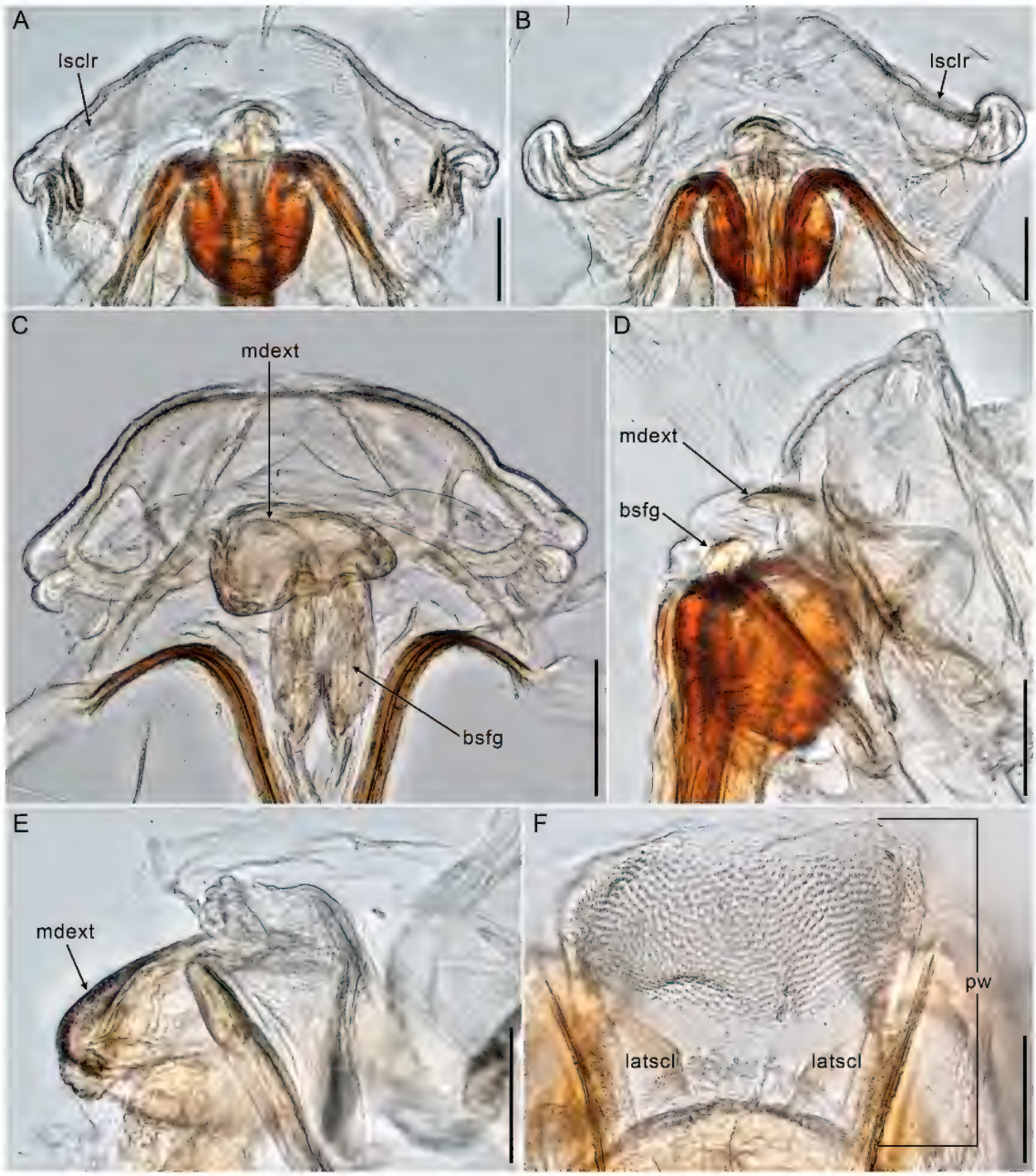


Plate 42. Digital female genitialic images of *Bifidostylus* spp. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, ventral view. **D, E.** Bursa copulatrix left lateral view. **F.** Posterior wall, anterior view. *B. occidentalis* AMNH_PBI 00129851: C, E, F. *B. silveirae* AMNH_PBI 00135362: A, B, D. Scales 100 m.

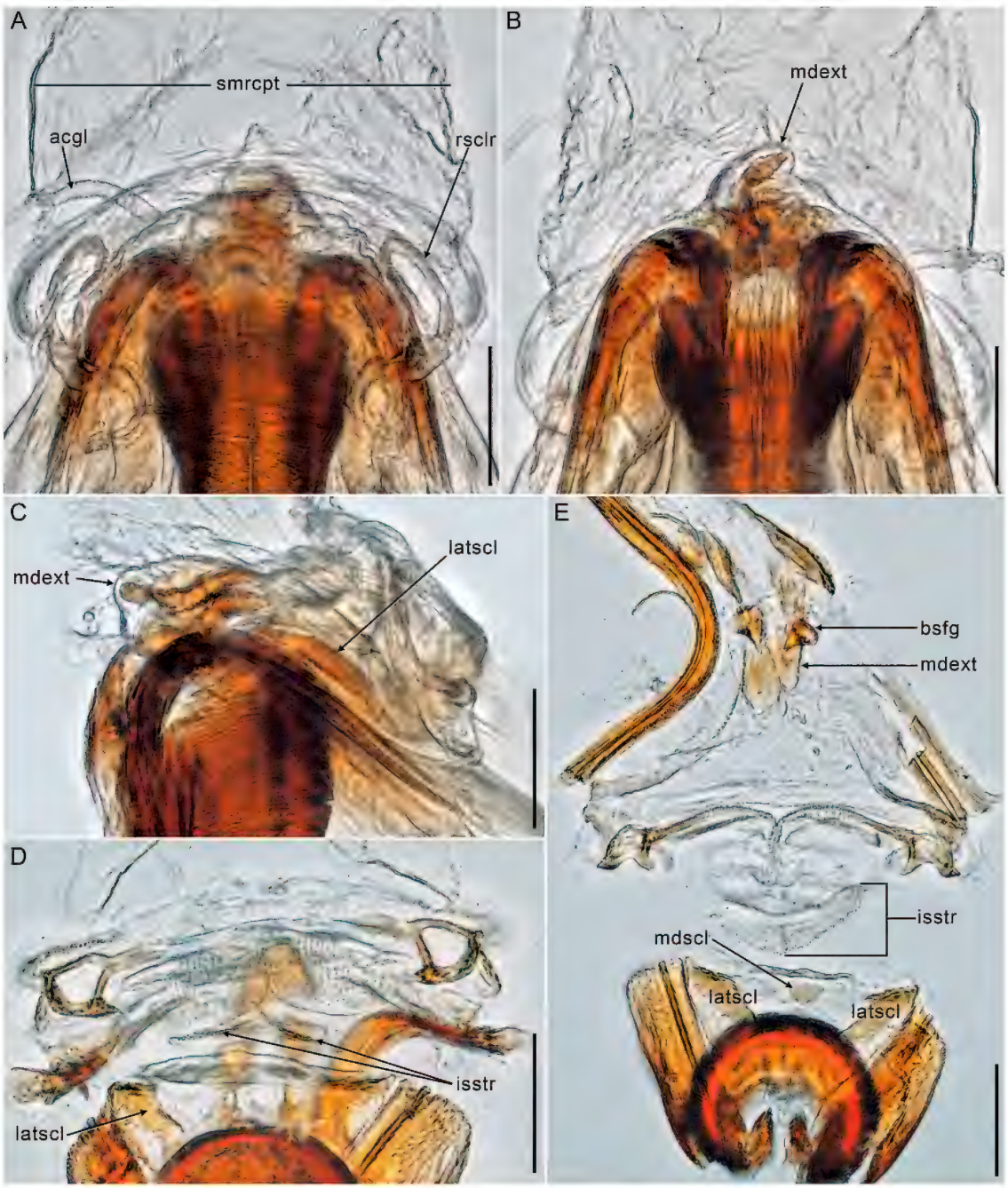


Plate 43. Digital female genitialic images of *Dicyphylus* spp. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. **D.** Bursa copulatrix, dorsal view. **E.** Bursa copulatrix open ventral view. *D. halgani* AMNH_PBI 00135610: D, E. *D. pilbara* AMNH_PBI 00390048: A–C. Scales 100 m.

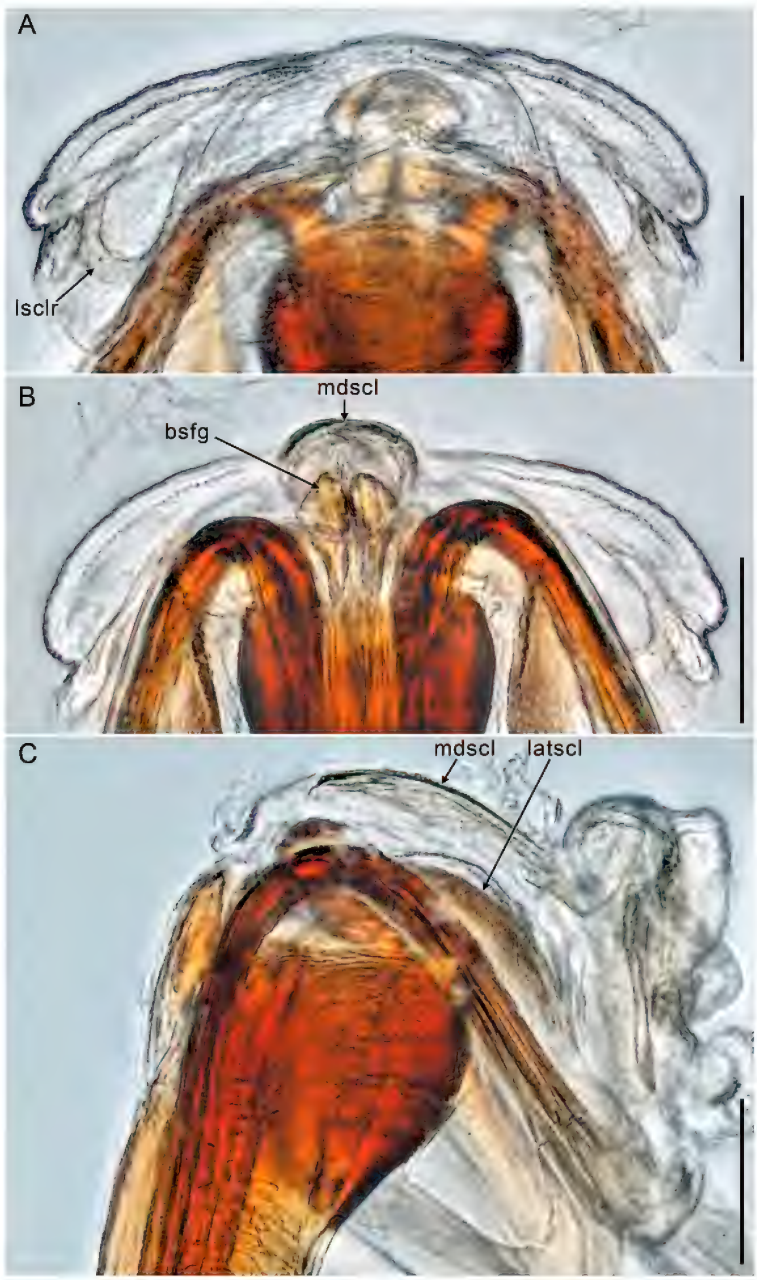


Plate 44. Digital female genitialic images of *Eremotylus stuarti*. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. AMNH_PBI 00098588. Scales 100 m.

Plate 45. Digital female genitialic images of *Grandivesica* spp. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. **D.** Posterior wall, anterior view. **E.** Bursa copulatrix dorsal view. *G. aurea* AMNH_PBI 00392824: A–C. *G. cassisi* AMNH_PBI 00129780: E. *G. pilbara* AMNH_PBI 00412638: D. Scales 100 m.

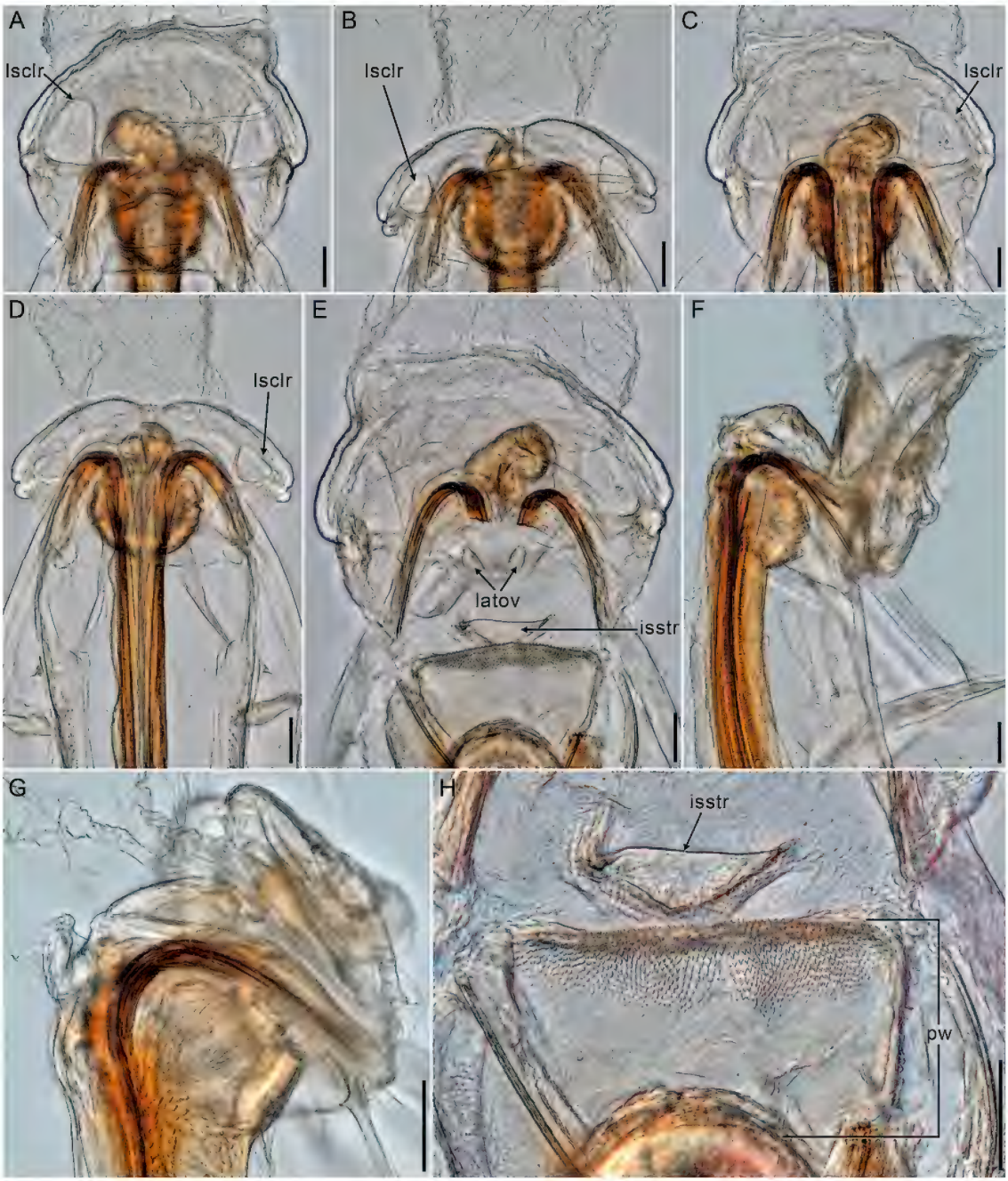


Plate 46. Digital female genitialic images of *Gyrophallus* spp. **A, B.** Bursa copulatrix, dorsal view. **C, D.** Bursa copulatrix, ventral view. **E.** Bursa copulatix, open ventral view. **F, G.** Bursa copulatrix, left lateral view. **H.** Posterior wall, anterior view. *G. donggali* AMNH_PBI 00128502: B, D, G. *G. symondsae* AMNH_PBI 00414019: A, C, E, F, H. Scales 100 m.

Plate 47. Digital female genitialic images of *Halophylus* spp. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. **D, E.** Base of second gonapophyses, dorsal view. *H. chenopodos* AMNH_PBI 00132962: D. *H. tecticornii* AMNH_PBI 00098132: A–C; AMNH_PBI 00098272: E. Scales 100 m.

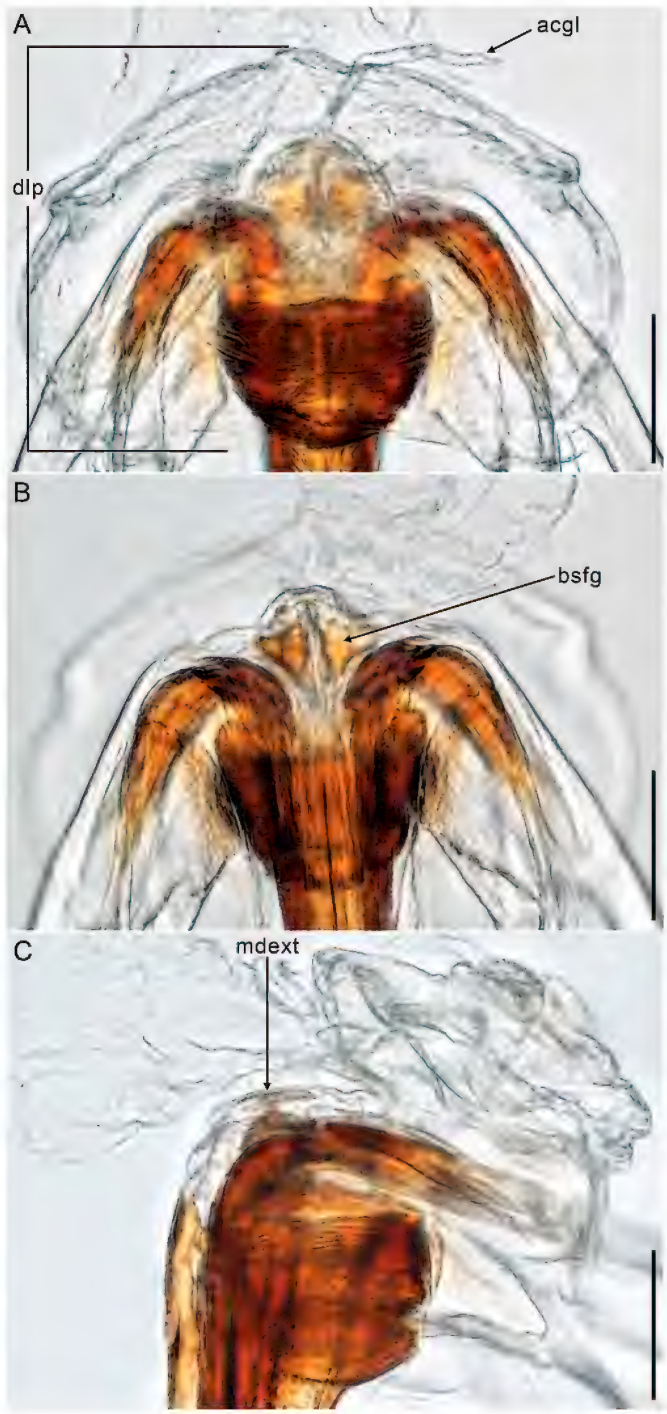


Plate 48. Digital female genitialic images of *Maculiphylus eremophilae*. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. AMNH_PBI 00136702. Scales 100 m.

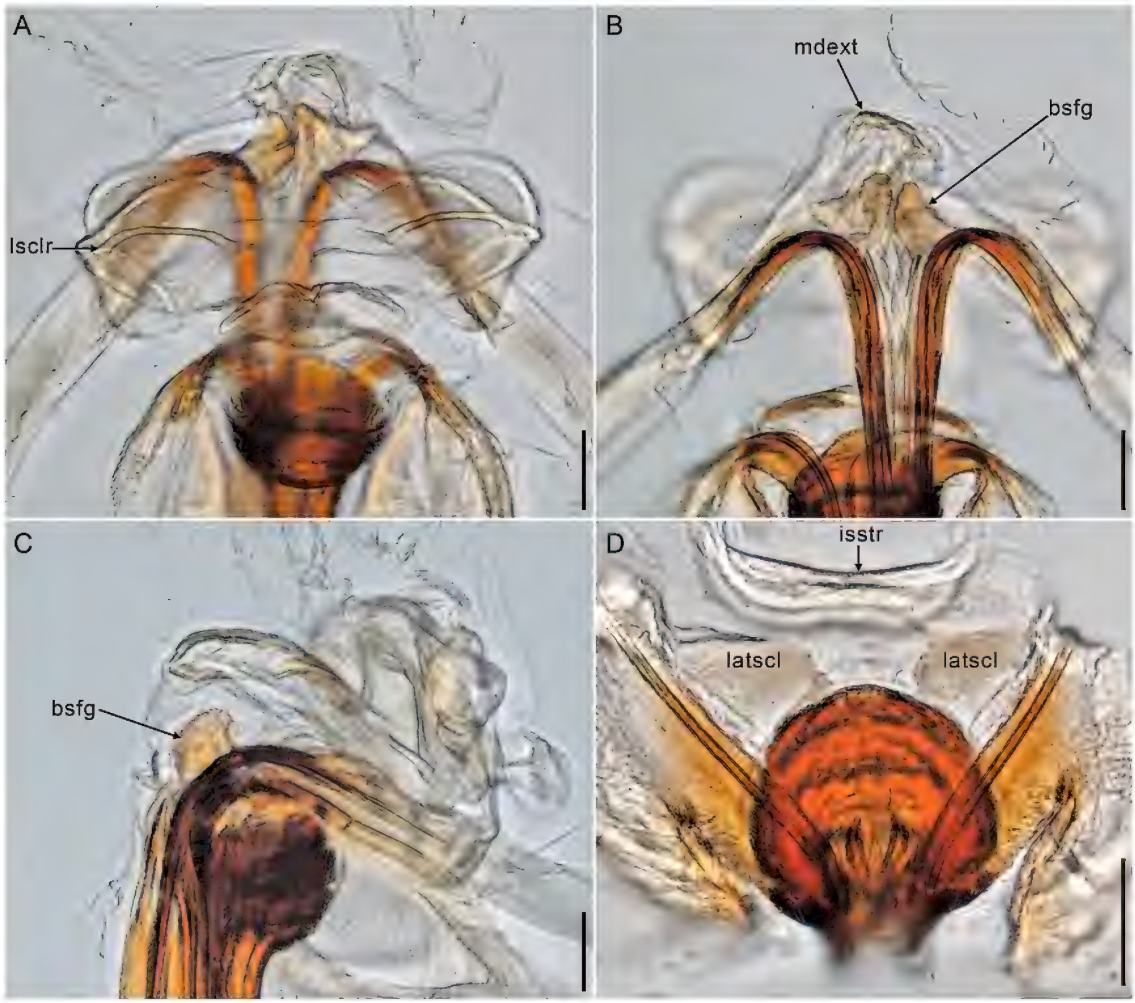


Plate 49. Digital female genitialic images of *Myoporophylus grossi*. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. **D.** Posterior wall, anterior view. AMNH_PBI 00131739: A, B, D; AMNH_PBI 00131740: C. Scales 100 m.

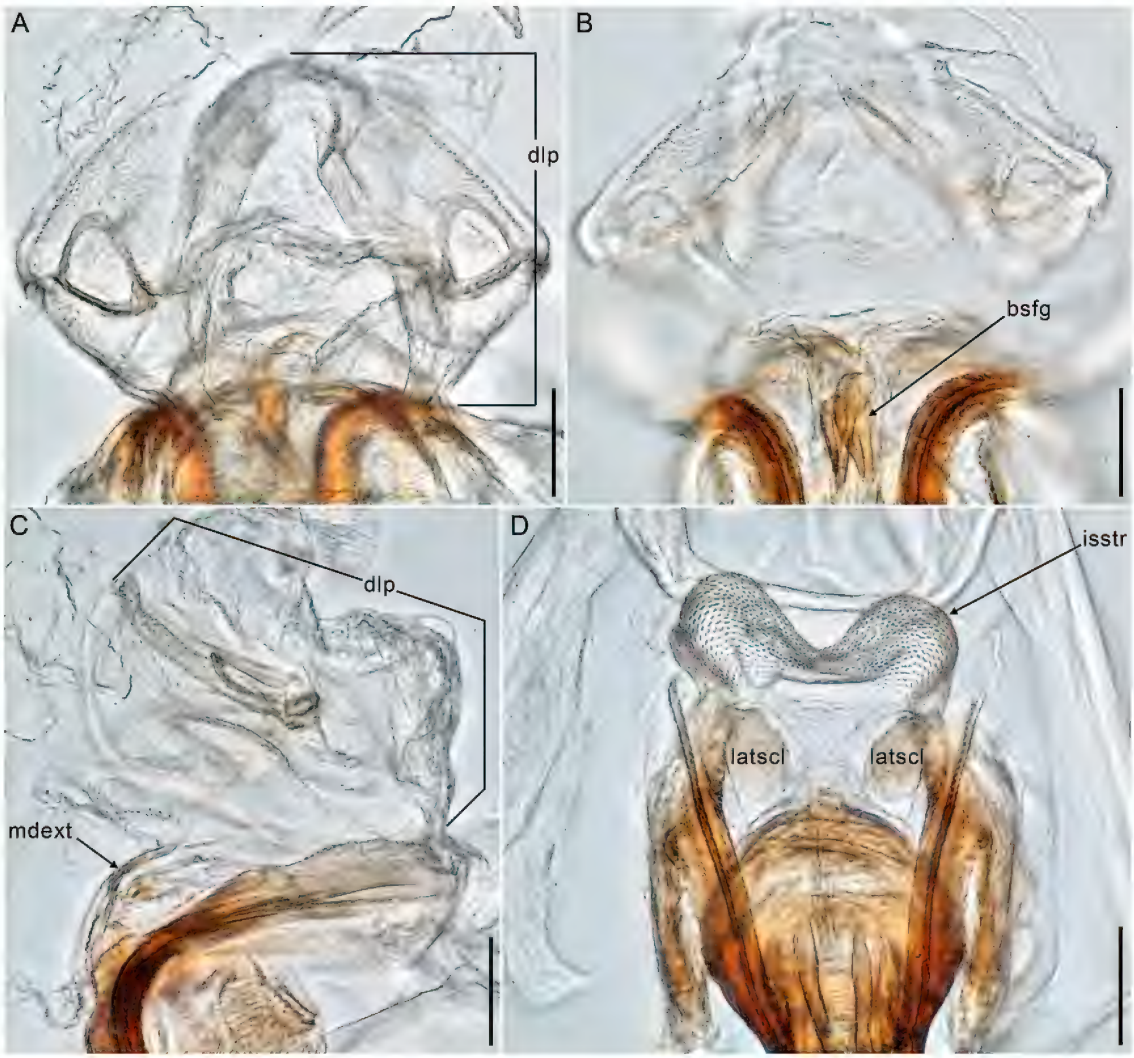


Plate 50. Digital female genitialic images of *Myrtophylus calytrix*. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral view. **D.** Posterior wall, anterior view. AMNH_PBI 00135532: A–C; AMNH_PBI 00135531: D. Scales 100 m.

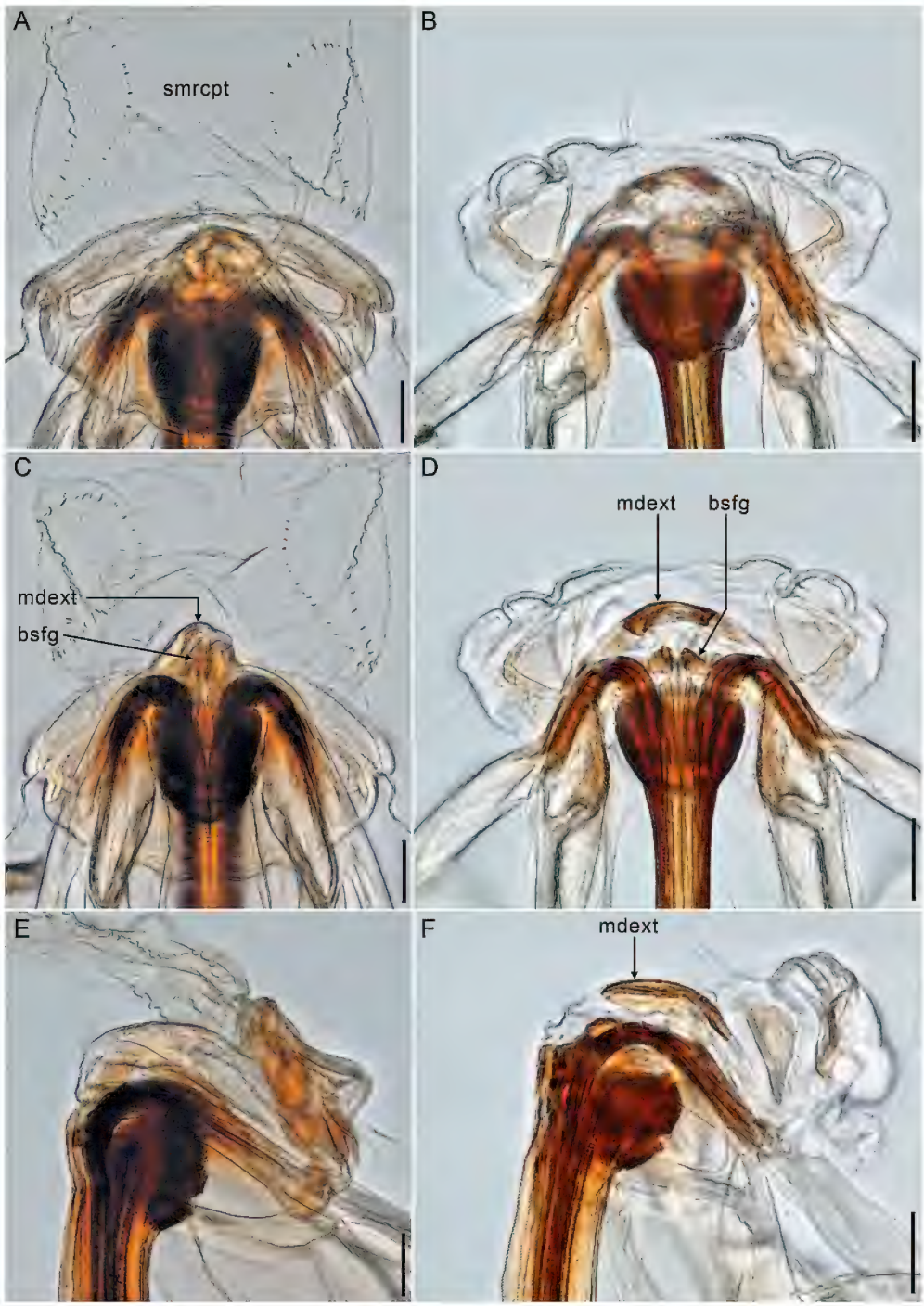


Plate 51. Digital female genitialic images of *Omnivoriphylus* spp. **A, B.** Bursa copulatrix, dorsal view. **C, D.** Bursa copulatrix, ventral view. **E, F.** Bursa copulatix, left lateral view. **D.** Posterior wall, anterior view. *O. frankenii* AMNH_PBI 00130144: B, D, F. *O. mangaensis* AMNH_PBI 00387510: A, C, E. Scales 100 m.

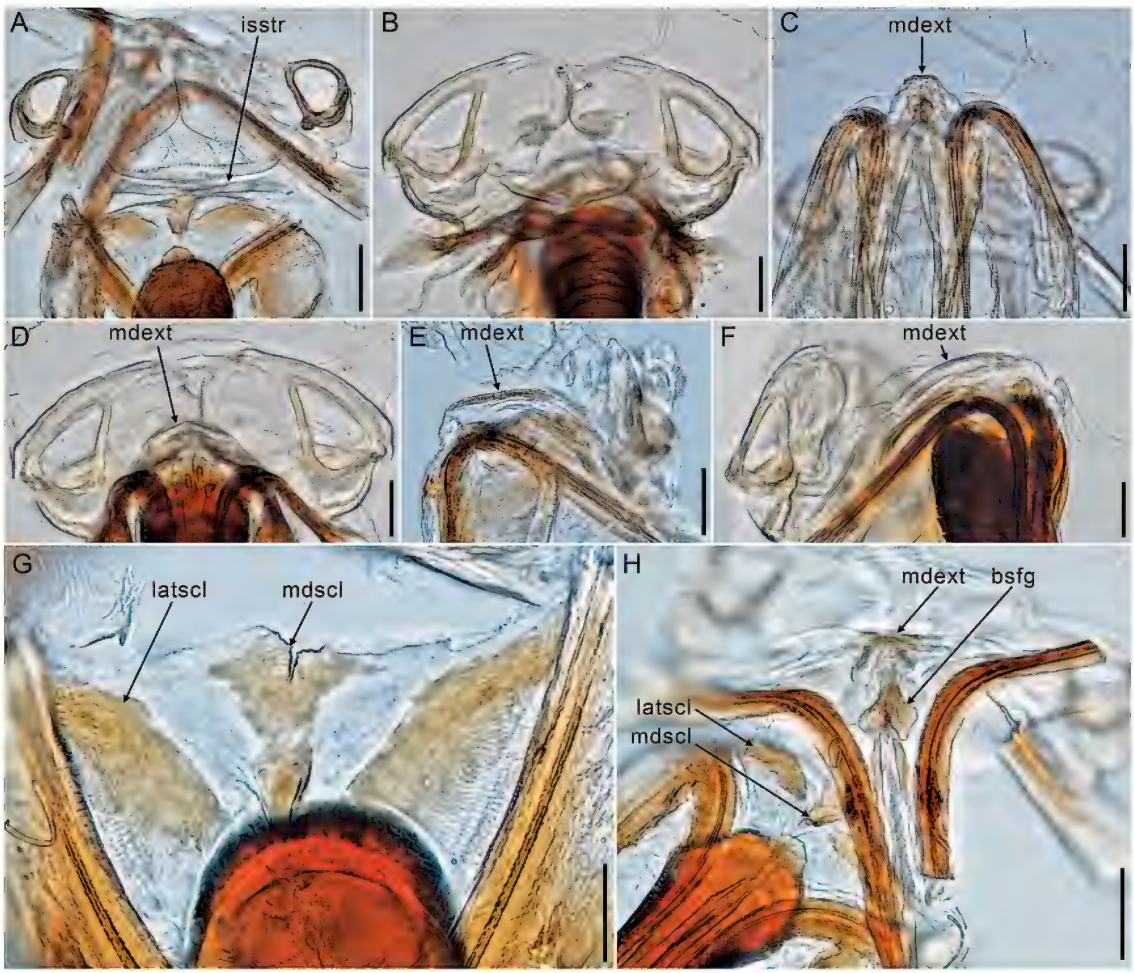


Plate 52. Digital female genitialic images of *Proteophylus* spp. **A, B.** Bursa copulatrix, dorsal view. **C, D.** Bursa copulatrix, ventral view. **E.** Bursa copulatix, left lateral view. **F.** Bursa copulatrix right lateral view. **G.** Posterior wall, anterior view. **H.** Bursa copulatrix, open ventral view. *P. grevilleae* AMNH_PBI 00098789: A, G, H; AMNH_PBI 00098790: C, E. *P. petrophile* AMNH_PBI 00135214: B, D, F. Scales A–F, 100 m, G, 50 m.

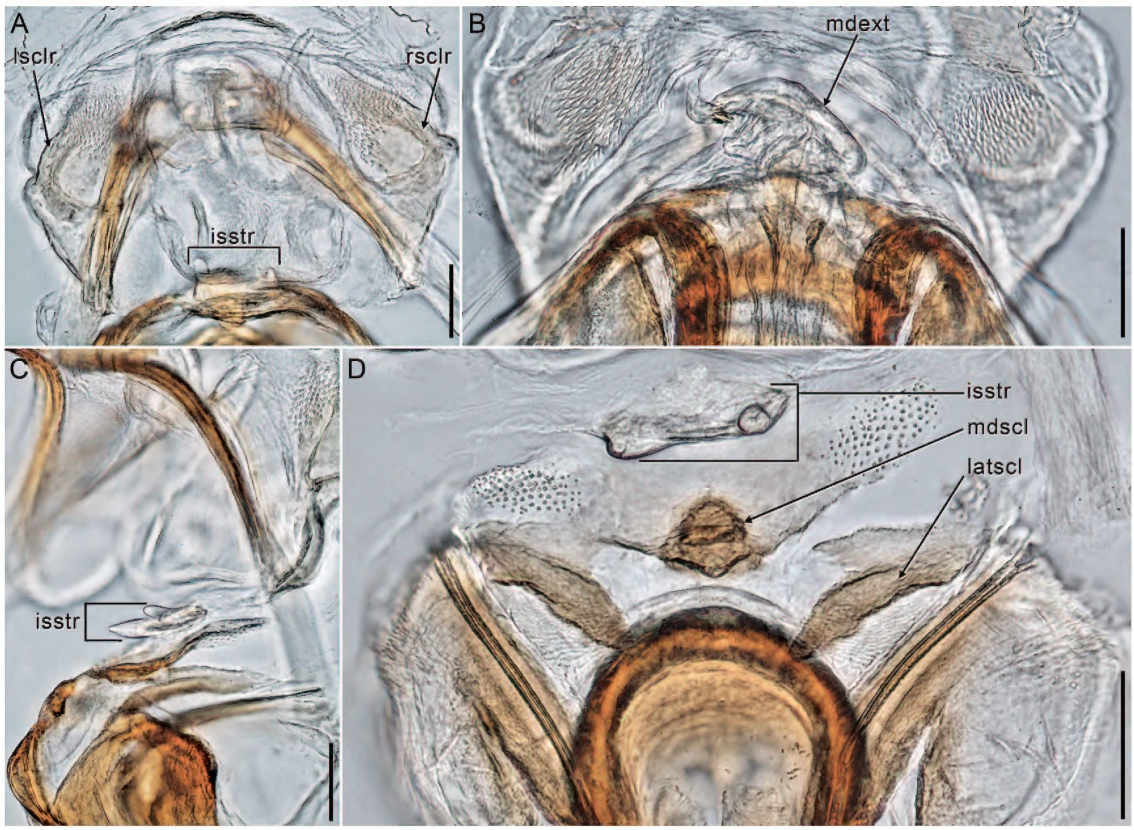


Plate 53. Digital female genitialic images of *Pulvillophylus rossi*. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, left lateral open view. **D.** Posterior wall, anterior view. AMNH_PBI 00391065: A, C, D; AMNH_PBI 00391066: B. Scales 100 m.

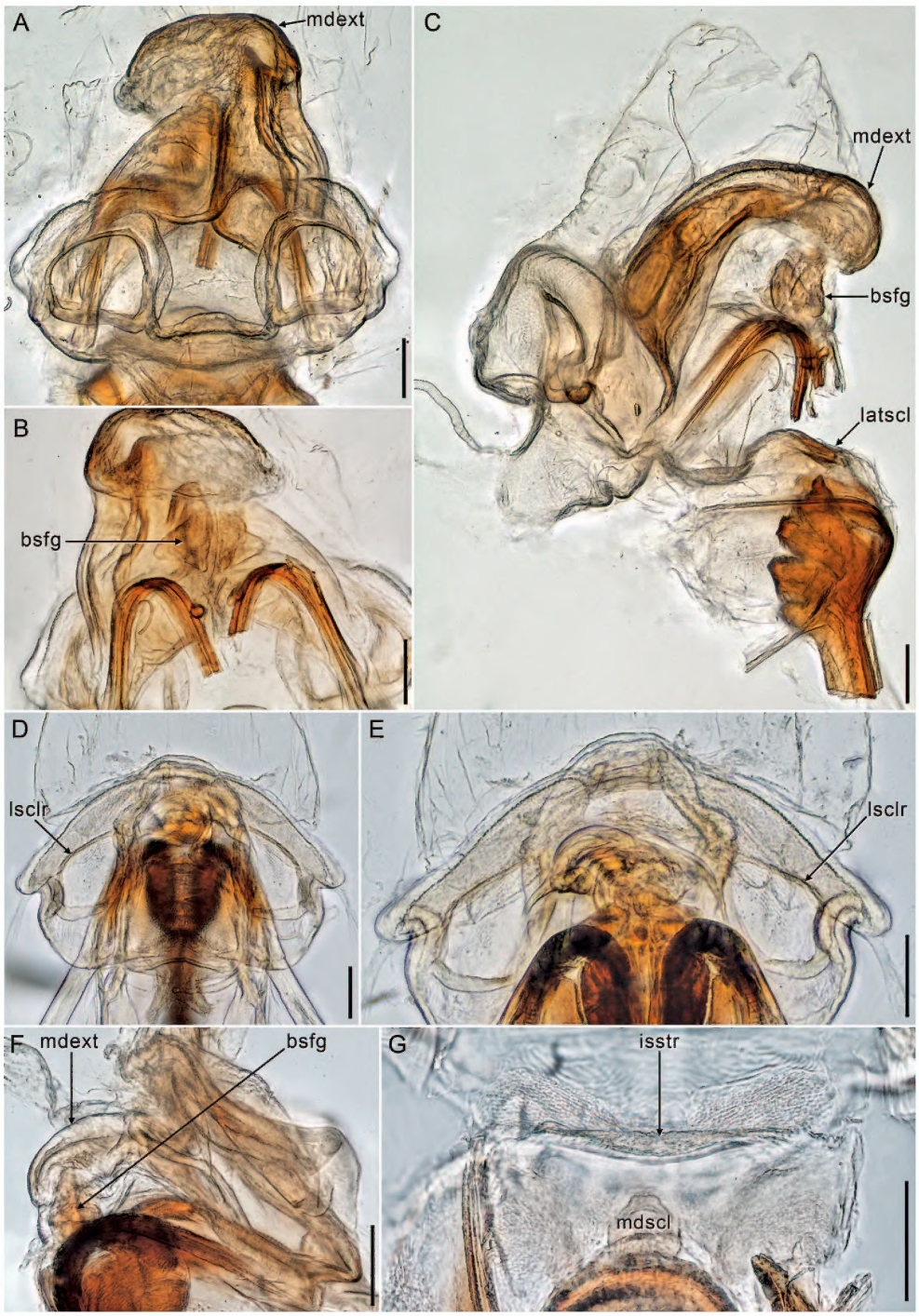


Plate 54. Digital female genitialic images of *Spinivesica* spp. **A, D.** Bursa copulatrix, dorsal view. **B, E.** Bursa copulatrix, ventral view. **C.** Bursa copulatix, right lateral open view. **F.** Bursa copulatrix left lateral view. **G.** Posterior wall, anterior view. *S. eremophiloides* AMNH_PBI 00134876: D–G; *S. spiculatus* AMNH_PBI 00412520: A–C. Scales 100 m.

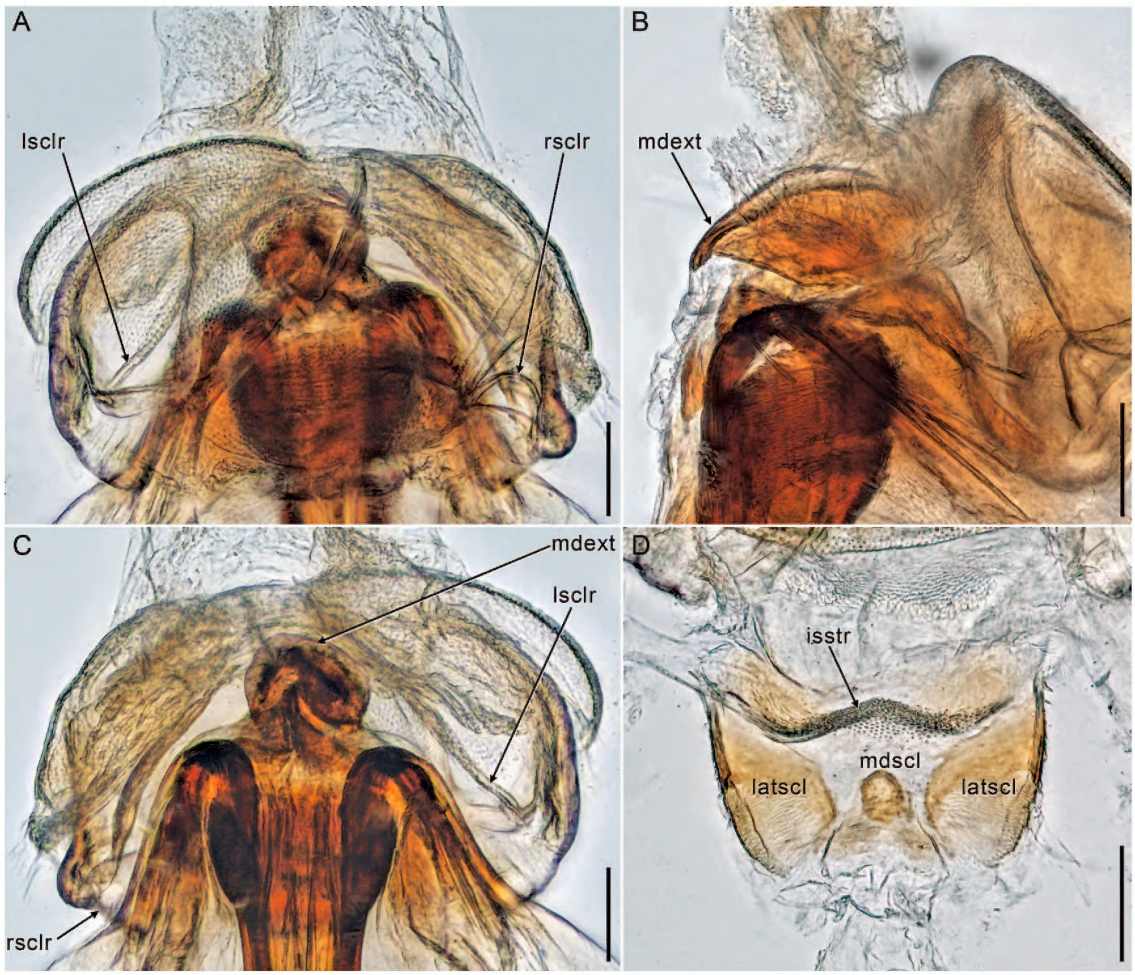


Plate 55. Digital female genitialic images of *Telophylus eremophilae*. **A.** Bursa copulatrix, dorsal view. **B.** Bursa copulatrix, left lateral view. **C.** Bursa copulatix, ventral view. **D.** Posterior wall, anterior view. AMNH_PBI 00412331: A–C; AMNH_PBI 00412324: D. Scales 100 m.

Scientific Publications of the American Museum of Natural History

American Museum Novitates
Bulletin of the American Museum of Natural History
Anthropological Papers of the American Museum of Natural History

Publications Committee
Robert S. Voss, Chair

Board of Editors
Jin Meng, Paleontology
Lorenzo Prendini, Invertebrate Zoology
Robert S. Voss, Vertebrate Zoology
Peter M. Whiteley, Anthropology

Managing Editor
Mary Knight

Submission procedures can be found at http://research.amnh.org/scipubs

All issues of *Novitates* and *Bulletin* are available on the web (http://digitallibrary.amnh.org/dspace). Order printed copies on the web from:
http://shop.amnh.org/a701/shop-by-category/books/scientific-publications.html

or via standard mail from:
American Museum of Natural History—Scientific Publications
Central Park West at 79th Street
New York, NY 10024

♾ This paper meets the requirements of ANSI/NISO Z39.48-1992 (permanence of paper).

On the cover: (clockwise from top left) Male *Grandivesica kadji*, endosoma of *G. kadji*, female *G. kadji*, female genitalia of *G. cassisi*, pretarsus of *G. cassis*, and *Eremophila caperata*, in bloom.